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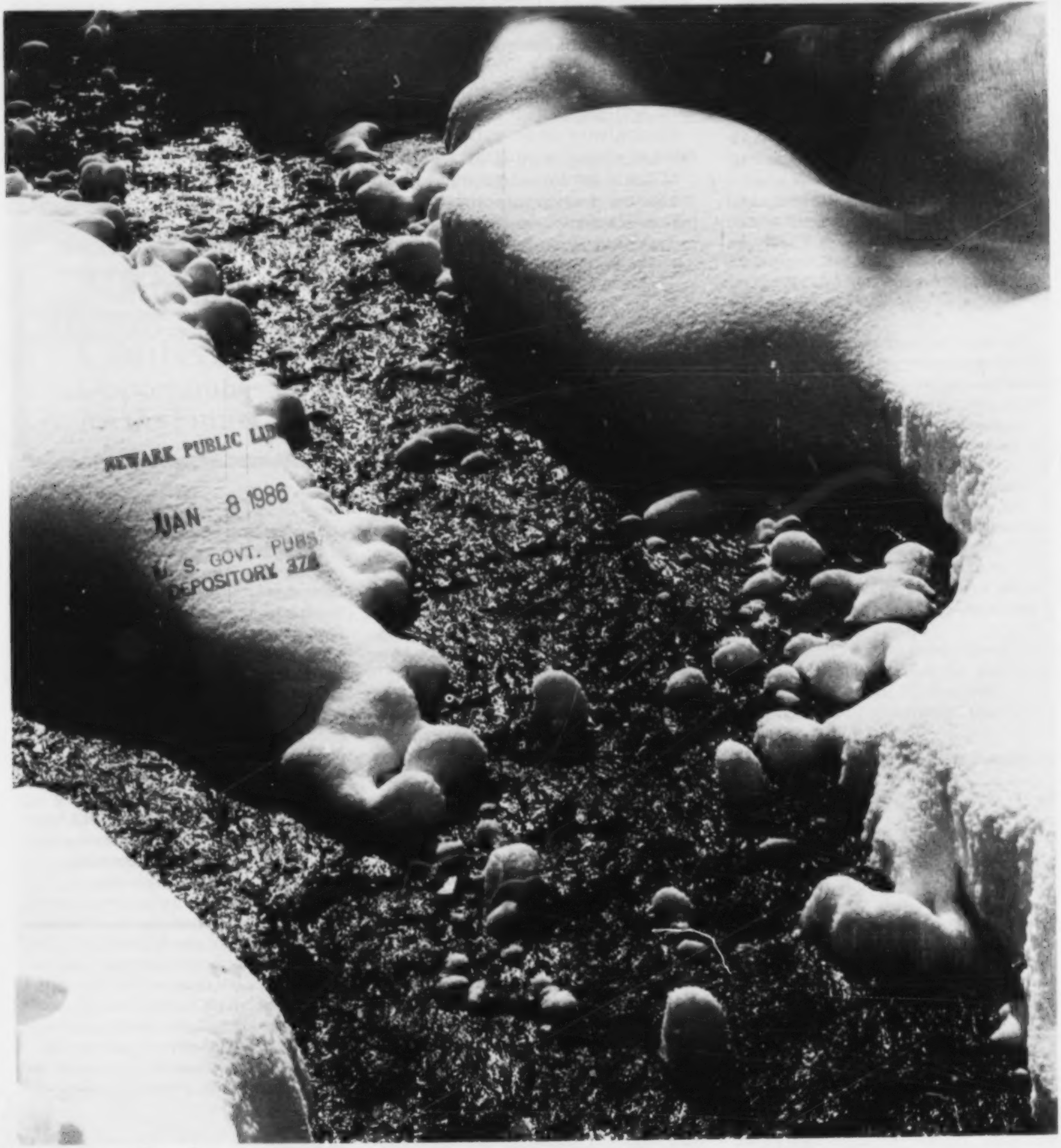
January 1986 Volume 6, Number 10

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service



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Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013-2890.

Subscriptions
Send subscription orders to:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Comments:
From the SCS Chief

We Can Cut Flood Losses

Every year, floods damage more and more property, crops, and important wildlife habitat—especially in upstream areas.

The Soil Conservation Service and conservation districts can help solve these problems. And help we must. Flood prevention is one of our highest priorities today.

Landowners themselves can reduce potential flood damages quite a bit. But they need information on what to do, and they need community support.

SCS and districts can determine where the flood hazards are, and how severe they are. We can develop public information materials and campaigns. We can recruit and train volunteers. We can cooperate with other Federal and State agencies on ways to reduce flood damages, and ways to streamline the planning and review of project activities. We can help communities design warning and flood emergency support systems.

Finally, we can help blend all these efforts into overall action plans that work. What we need is to help many more communities and individuals learn about flood hazards and do something about them.

Wilson Scaling

USDA Earmarks $10 Million for Emergency Flood Relief

Secretary of Agriculture John R. Block earmarked $10 million to meet extraordinary flood emergency conditions in the hard-hit areas of West Virginia and Virginia, where flood emergency damage reached record proportions.

Secretary Block, using an emergency program administered by USDA's Soil Conservation Service, directed the agency to cooperate with other Federal and State agencies and use $6 million in West Virginia and $4 million in Virginia to open water courses that were plugged with sediment and debris as the result of massive flooding caused by torrential rains in early November.

Severe stream blockage and flood flows caused streams to overflow into homes, businesses, and highways. Repairs will be made to restore stream channels, dikes, levees, and other flood retarding works which suffered extensive damage. The situation constitutes an immediate threat to life and property.

Conditions are such that streams and flood control structures cannot handle new flood waters, nor can communities begin to function again without extensive restoration work.

Block said the assistance will come from watershed construction funds for use under the continuing resolution for fiscal year 1986.

Cover: Melting snow, one of the major sources of water in the West. The Soil Conservation Service is giving reservoir operators individualized operating guides to help them control water levels in their reservoirs. See article on pages 10–11. (Hyalite Creek, Montana. Photo by Phil Farnes, supervisor of the SCS Snow Survey Program for Montana.)

ohn R. Block
Secretary of Agriculture

ilson Scaling, Chief
Soil Conservation Service

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Range Conference Promotes Spirit of Cooperation

National Range Conference
Opportunities for the Future

Calling rangeland "America's forgotten esource," Deputy Secretary of Agriculture John R. Norton presented the keynote address at the National Range Conference, November 6 through 8, 1985. Norton set the stage for the nearly 600 ranchers, educators, and Government officials who met in Oklahoma City, Okla., for the 3 days of active discussion. He emphasized that all Americans have a stake in protecting the Nation's range resources.

Norton said, "The major use of rangeland surely will continue to be forage for livestock. But new opportunities increasingly will arise n a growing economy to use this resource in other, less traditional ways." He challenged he group to make range research, and its practical application on the range, "as dynamic as the basic resource itself."

Another challenge we face, according to Norton, is "what to do with land that may be committed to a conservation reserve under he new farm bill" and what should be done to ensure this land stays out of production after he conservation reserve contract expires.

Several recurring messages emerged from he sessions that followed Norton's speech:

- Rangeland, occupying more than a billion acres of the United States and supporting the livelihood of millions of families, is important to the Nation's future.
- There are a number of valuable and useful products from range, and several environmental and esthetic values. Use of rangeland will become more diversified in the future.
- Forage for livestock will continue to be the primary use, but other uses—such as wildlife, recreation, and crops for industrial, energy, or food purposes—will be economically desirable for the landowner, public land manager, and the community.
- Strengthened research programs are needed, along with more practical and timely application of the research findings, in order to help landowners, land managers, and others make informed choices on livestock and plant varieties, treatment options, marketing strategies, and assistance needs.
- Range issues cannot be addressed by themselves; they need to be blended with other economic, social, and environmental questions in order to achieve range strategies that are timely, cost-effective, and fair.
- There is potential for conflict among all the uses of range or interests in range, but such conflicts can be minimized or resolved if the parties involved work hard at learning each other's points of view and at helping each other increase public understanding of the many values and needs of rangelands, and if they are open to modifying their own objectives or practices.
- Tax policies, trade policies, and a number of other factors outside the agricultural sector influence the use and condition of range. The likely future demands on range and its likelihood of being able to meet those demands need to be addressed as well.

Another major speaker at the conference, Secretary of the Interior Donald P. Hodel, spoke of his Department's interest in rangeland including protecting wilderness and parks, improving our Nation's ability to meet its mineral and energy requirements, protecting recreation and heritage resources, and helping to manage Indian affairs.

He said that in addition to management responsibilities for public lands, "we have lease arrangements with thousands of ranchers, and we have relationships with millions of Americans in the hiking, fishing, and camping crowd. All of these multiple uses and multiple interests can be compatible."

He spoke of U.S. Department of the Interior (USDI) staffs being encouraged to be "good neighbors," and he pointed to increased cooperation between the Bureau of Land Management and USDA's Forest Service.

Hodel mentioned Coordinated Resource Management Planning and a working partnership between public and private sectors. He outlined a new USDI public awareness campaign—Take Pride in America—to encourage all Americans to recognize their stewardship responsibilities for public lands.

He called on conference participants to "encourage more of our fellow Americans to work together to improve the resource base, to set aside conflicts that are causing us difficulty, and to establish some consensus."

The National Range Conference was sponsored by more than 60 commodity, conservation, and public-interest groups along with the Council on Environmental Quality, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture, and the U.S. Department of the Interior. Papers presented at the conference will be available in a proceedings to be published within the next few months.

For more information, contact Doug Sellars, Conference Coordinator, Soil Conservation Service, P.O. Box 2890, Washington, DC 20013-2890 or telephone (202) 382-1858.

News Briefs

Intensive Grazing System Introduced in Northeast

A field review of rotational grazing and fencing methods, perfected in New Zealand and gaining attention in the Northeast through its recent introduction in Vermont, attracted more than 60 agronomists and soils specialists from 13 Northeast States. Sponsored by the University of Vermont's Extension Service and the Soil Conservation Service, the review held last July consisted of onfarm presentations by six farmers in Chittenden and Franklin Counties who are employing the Voisin intensive rotational grazing system on their dairy and sheep operations.

Begun in Europe by Andre Voisin, a French farmer and biochemist, the system offers distinct advantages over conventional grazing techniques. It is applicable to Northeast conditions with cool season grasses.

Through the use of lightweight moveable fencing, traditional continuous pastures are divided into 10 paddocks or more. Livestock intensively graze the first paddock and then are rotated through the remaining paddocks, allowing even-aged regrowth of the plant materials in the first paddock by the time the livestock are rotated back.

Short grazing periods and frequent rest periods increase plant vigor and result in fast regrowth of grass and clover. By mobstocking each paddock selective grazing is virtually eliminated. Unproductive bushy growth is curtailed and even regrowth occurs at maximum production instead of allowing some areas to become mature while other patches are overgrazed by continual grazing before regrowth. The grazing efficiently recycles nutrients in the animals' manure and keeps these nutrients available to plants. And in times of rapid pasture growth, the surplus can be cut for hay, haylage, or silage. The Voisin system is also an ideal way to bring marginal land or neglected pastures into production without costly pasture renovation or reseeding.

Vermont's SCS Agronomist Frank Webb (left) and State Resource Conservationist Rick Heaslip examine portable fencing used with the Voisin intensive grazing system.

Other testimony by the farmers on the Voisin system's worth gave credence to additional benefits. Besides higher quality forage, higher protein content, fewer weeds, and increased forage production, other attributes include an extended grazing season, reduced labor and production costs, reduced pasture damage, inexpensive startup costs, and increased profits.

With proper guidelines, the Voisin system promises to be a boon for farmers just getting started with limited cash flow. This intensive rotational grazing system requires no harvesting equipment, except for haying or ensiling equipment if excess forage is saved; no manure handling; and no storage facility during the growing season. And livestock suffer fewer medical problems associated with confinement and concrete.

As one convinced dairy farmer on the tour's agenda said, "The agriculture industry being what it is, we're under the gun like everybody else. We've concluded that raising our own feed just isn't profitable. We just might sell our machinery in the fall, buy hay in winter, and live it up in the summer."

While this system is relatively new in this country and can't be expected to solve all the financial and management problems of today's farmers, it does seem to have considerable merit in cutting costs and labor.

Ann H. Dudas,
public affairs specialist, SCS, Winooski, Vt.

Iowa Field Office Calls for Volunteers to Complete Field Work

One reason volunteers are so important in conservation is that they're usually there when they're needed the most. Just ask Jack Storkamp, district conservationist for the Soil Conservation Service in Winneshiek County, Iowa.

You've heard of people working themselves out of a job. Well, it didn't happen that way with Storkamp and his staff. The more they worked, the more work they had to do, until finally they couldn't do the work they had to do because of the work they had done.

Winneshiek County is in rural northeast Iowa where there are a lot of dairy farms. Most of the farmers grow corn and a hay crop, usually alfalfa.

About 2 years ago, after determining that soil erosion posed a serious threat to the county, SCS targeted the county for intensive erosion-control work and assigned Storkamp two full-time soil conservationists. The new soil conservationists were to help Storkamp and his two technicians draw up conservation plans for farmers and help the farmers apply the practices called for in the plans.

The extra personnel paid off. During the first year, 1984, Storkamp and his staff, working through the Winneshiek County Soil Conservation District, helped county farmers to apply contour farming and stripcropping on about 2,300 acres. By the spring of 1985 about 5,200 acres had been scheduled for either contour farming or contour stripcropping. The requests for contour stripcropping alone went from 600 acres in 1984 to 2,400 acres in 1985.

"We got excellent response from the farmers," Storkamp said. "We got such good response that by 1985 we weren't sure we could handle it all."

Contour farming and stripcropping both require SCS workers to lay out the fields with marks for the farmers to follow as they go around the slope with their equipment. A crew of two can mark about 180 acres a day for contouring. The same crew can lay out about 40 to 60 acres of strips a day, depending on the contour and condition of the land.

The problem was that there are only a few weeks when the fields are dry enough to walk in before planting time in mid-May. How were Storkamp and his staff going to lay out 5,200 acres?

Realizing he needed help, Storkamp put out a call for volunteers through the local newspaper and other channels. He requested help from anyone capable of walking through corn stubble and holding a hand level. All he could promise were a lot of exercise, fresh air, and a good feeling for helping to conserve the soil.

Storkamp wasn't disappointed. In all, six persons from the town of Decorah and the surrounding areas stepped forward. One was a recent school graduate who, being unemployed, worked with the field crews as needed until all of the acreage was laid out. The others worked a day at a time as their schedules allowed.

"We gave them a little training and immediately put them in the field," Storkamp said. "This gave us three full-time crews and enabled us to get the job done. Not only did we plan more conservation than ever before, we put more conservation on the ground. Without the volunteers, I don't think we could have met our commitments. It's really that simple."

Conservation Grows on the Pacific Islands

Farmers and ranchers in the Mariana Islands are among the first to see America's day begin, and they are among the most recent to join the conservation district effort to care for the Nation's resource needs. Five Pacific island soil and water conservation districts are now organized in this westernmost part of the United States. Bounded by the Pacific Ocean and the Philippine Sea, the Mariana Islands, including the Territory of Guam, are a chain of 15 islands located north of the equator beginning at the 13th parallel.

Since the end of World War II, tourism and a rapidly developing economy have made significant changes in island life. Family farming is no longer the primary occupation. Farms have become businesses. Farmers' search for improved productivity has brought them to agricultural modernization. They recognize their needs for water development and conservation and are aware of the importance of soil erosion control.

Farms are small—most are 1 to 5 acres. Tropical agriculture varies from agroforestry on steep slopes to small row crop plantings and orchards. Much of the food consumed on the islands is imported. Conservation farming could help turn around this dependence on imported food as farmers aim for greater sufficiency in adapted crops and hope to develop an export market. Consequently, soil and water conservation districts have an important role to fill as board members aggressively pursue district objectives.

District legislation for the Commonwealth of the Northern Marianas was passed in 1985, joining that of Guam's, enacted in 1984. Although the system of conservation districts is unfamiliar to island people, the concept of stewardship is one which is well rooted in the traditions of past agrarian subsistence societies.

The legislation that emerged from several months of intense planning sessions is specific to the conditions and needs of the islands' people. Mickey LeonGuerrero, of the Guam Planning Bureau, and a legislative assistant worked with the Soil Conservation Service staff to modify the conservation districts model law. The democratic legislative process in Guam and the Commonwealth is typically lengthy and complex. It is a tribute to the purposes of the program and the vision of the legislators that the laws emerged in viable form.

In Guam, two districts were formed. They reflect the very different topographic and soil characteristics between the northern and southern parts of the island. Northern Guam is a raised plateau. The conservation problems in the north come from wind damage and shallow soils. The soils are generally neutral to alkaline and overlie coral limestone. The south is mountainous. There, conservation problems come from steep slopes and flooding rivers. The soils are acidic, derived from volcanic materials.

Each district board is composed of five members who carry the title of director. Meeting places are rotated from village to village within the district to ensure the participation of cooperators throughout the area. The Guam districts already have about 20 cooperators.

In the Commonwealth of the Northern Marianas three district boards have been formed, each having four board members called administrators. Saipan and the northern islands are within one district. The islands of Tinian and Rota have their own districts. Cattle are more important in the Commonwealth than in Guam, and several district administrators are ranchers.

SCS assistance to all five districts is provided from the Guam field office. In providing this assistance, SCS conservationists face unpredictable travel conditions. Island hopping, often by circuitous routes, is part of the conservationists' job, as they travel to determine conservation needs and apply practices on these remote islands.

Conservationists may encounter any of several languages on island farms including Chamorro, English, Tagalog, and Japanese. Nevertheless, workshops have been conducted on basic soils information and the use of SCS soil surveys, and on erosion control for equipment operators. Guam soil and water conservation districts have also developed demonstration fields and tours.

The conservation districts' main challenge will be one of developing broad recognition and support. Budgets are tight in the islands. New programs must compete against older ones for local departmental funding. Farmers, ranchers, and district leaders form a groundswell of strength eager to meet the conservation challenge in this far west corner of America.

Joan B. Perry,
resource conservationist, SCS, Mangilao, Guam

Conserving Water: The Untapped Alternative

Managing the demand for water, instead of constantly trying to meet it, is the only hope for a truly secure and sustainable water future, according to Sandra Postel, senior researcher at Worldwatch Institute, in her recent report, *Conserving Water: The Untapped Alternative.*

Worldwatch Institute is an independent, nonprofit research organization created to analyze and focus attention on global problems. Directed by Lester R. Brown, Worldwatch Institute is funded by private foundations and United Nations organizations. Worldwatch papers are written for a worldwide audience of decisionmakers, scholars, and the general public.

According to Postel, investments in improving efficiency and management yield more usable water per dollar than conventional water projects such as dams and river diversions. These alternative investments enable food production, industrial output, and cities to expand without parallel increases in water demands.

"Worldwide, the efficiency of irrigation systems averages only 37 percent," said Postel. "Much water is lost as it is moved from reservoirs to farmlands and applied to fields. But new technologies and better management can boost efficiencies dramatically, while cutting energy costs and often increasing crop production at the same time."

Postel said one new technology called LEPA—low-energy precision application—is gaining popularity in northwest Texas, where depletion of the Ogallala Aquifer threatens a lucrative farming economy. LEPA can upgrade conventional sprinkler designs from 70 percent efficiency to 95 percent, and typically pays for itself in reduced pumping costs in 5 to 7 years. The LEPA method delivers water closer to the crops through tubes hanging down from sprinkler arms.

"If widely adopted throughout the U.S. High Plains, such improvements could greatly slow depletion of the Ogallala, which supports about a fifth of U.S. irrigated land," said Postel.

In the report Postel said that in the Third World, better management alone could reduce water withdrawals for most canal systems by 10 to 15 percent, allowing new land to be brought under irrigation at a much lower cost than developing new supplies. Raising irrigation efficiency by 10 percent in the Indus region of Pakistan, for example, could provide enough water to irrigate an additional 2 million hectares.

Farmers will not invest in water efficiency, however, unless pricing policies that promote wastefulness are dismantled, said Postel. Many governments heavily subsidize major irrigation projects. But when charged more for water, farmers in Third World and industrial countries invariably use water more efficiently.

Industries have made some impressive gains in water efficiency, according to the study. Recycling rates in the major water-using manufacturing industries in the United States have steadily risen in recent decades, with the paper industry recycling its water 5.3 times, petroleum refineries about 7 times, and chemical product manufacturers about 3 times.

"If major water-using industries reach the recycling levels projected for them for the year 2000, total water withdrawals for U.S. manufacturing—taking into account expected economic growth—will be 45 percent less than they were in 1978," said Postel.

The key has been strict pollution control standards that force industries to treat wastewaters before discharging them to the environment. As the standards get more stringent and treatment costs rise, recycling begins to pay.

"With such incentives, the Swedish pulp and paper industry, for example, halved its water use between the early sixties and late seventies, while doubling production," she said. "Not only are Sweden's rivers and streams much cleaner, but national water use in the mid-seventies was only half the level projected a decade earlier."

Economic incentives can also spur water efficiency in urban areas, many of which face severe physical and financial constraints on increasing water supplies. Comparatively modest investments in conservation enabled Tucson, Ariz., to defer $45 million in capital costs that would otherwise have been needed to expand the city's water supply. Because of its shift from simply meeting water demand to managing it, Tucson's water utility now plans for a per capita level of fresh water use 25 percent lower than in the early seventies, said Postel.

Although there is no ready-made package of conservation measures that will work in every city, successful efforts include some combination of water-saving technologies, economic incentives, regulations, and consumer education. Without these steps, cities in both industrial and developing countries will encounter enormous capital costs and more frequent and severe water shortages.

With proper incentives and institutional reforms, many prospective water crises could disappear, Postel said. In addition to pricing water at its replacement cost, she urges governments to change water rights and laws that are biased against conservation. Where water is drawn from nonrenewable underground supplies, Postel indicated that a tax on ground water pumping would help balance private and social costs, and encourage conservation.

As an example of the innovative approaches needed, the study points to a proposed scheme to supply growing urban demands in southern California with water saved through increased efficiency in a nearby irrigation district.

"Conservation investments appear a cost-effective way to balance supply and demand in southern California, and should be explored elsewhere," said Postel.

Standards can help spur efficiency when the market fails to do so. Several U.S. States now have laws requiring that fixtures installed in new homes, apartments, and offices meet specified water efficiency standards. But this transition could be made more quickly and uniformly if standards were set at the Federal level.

Even modest efficiency standards for toilets, showerheads, faucets, and dishwashers could reduce water use by a volume that would meet the yearly household needs of nearly 10 million people, the study found.

"The transition to a water-efficient economy will not be easy or painless, but it has begun and it should be fostered," Postel concluded.

Copies of *Worldwatch Paper 67, Conserving Water: The Untapped Alternative* are available for $4 each from the Worldwatch Institute, 1776 Massachusetts Avenue, NW., Washington, DC 20036.

SCS Emphasizes Ground Water Training

Researchers have recently identified new threats to the quality of ground water in several parts of the Nation. In response, the Soil Conservation Service is offering an advanced ground water training program to all of its geologists.

SCS currently has more than 70 geologists. The training program, which takes 18 months and is worth 12 graduate semester hours, is designed to bring the geologists abreast of the latest developments in the rapidly changing field of ground water research and technology. It is taught by correspondence by Wright State University in Dayton, Ohio. The first group of geologists completed the program in August 1985.

In other action, SCS has also started a course in the fundamentals of ground water for its soil conservationists, engineers, and people in other technical fields. A more basic course is currently under consideration for SCS managers. This course would provide an understanding of ground water systems, hydrogeochemistry, contamination, exploration techniques, resource management, artificial recharge, legal considerations, and related subjects.

The new emphasis by SCS on ground water training comes at a time of increased public concern over ground water pollution. As of February 1985, according to the U.S. Environmental Protection Agency, pesticides had been found in ground water in 23 States. Six pesticides had been found in ground water in New York and Iowa and five in California and Maryland.

According to estimates, more than 90 percent of rural Americans depend on ground water for all their water needs. Ground water provides about one-fourth of the Nation's total water consumption.

Lou Kirkaldie,
national engineering and ground water geologist,
Engineering Division, SCS, Washington, DC

SCS Becomes Computer Connection for Farmers

Jim and Terry Hofer, Waitsburg, Wash., recently used a computer printout from the Soil Conservation Service office in Walla Walla, Wash., to help convince a landlady to let them use conservation tillage on her land. The land had previously been moldboard plowed in a wheat-fallow rotation. But the computer printout showed profit advantages for using chisel tillage instead of plowing.

"Now we have her land on a 3-year rotation of winter wheat, spring barley, and summer-fallow," Jim Hofer says. "My brother and I are also using stripcropping as well as chisel tillage. Some of the slopes on her land are more than halfway to being straight up and down. Some slopes are more than a mile long. With the new cropping plan, however, we can increase farming profits and also do a better job of preventing soil erosion."

The Hofers have been working with the local SCS office on conservation tillage for 6 years. Larry L. Hooker, SCS district conservationist at the Walla Walla office, says many other growers have had experiences similar to the Hofers. They find that computer-run trial budgets help them see the advantages of conservation tillage.

"Our State SCS economist, Larry Edmonds, used to work out similar trial budgets with a desk-top calculator," Hooker recalls. "It took him a couple of weeks to do something we can now do on our office's computer in less than an hour, with Agnet's CROPBUDGET software."

The Walla Walla SCS office had its first experience with Agnet in 1981. But until 1983, Hooker obtained trial budgets by using a keyboard and printer in his office to link up by phone with a mainframe computer at the University of Nebraska. The Walla Walla office now has its own personal computer, and Hooker has programmed it with many of the equations and constant figures from the University of Nebraska computer. This saves the money previously spent on long-distance charges and University of Nebraska computer time.

Besides using Agnet's CROPBUDGET, Hooker uses a much simpler Agnet program called BESTCROP to help growers make decisions about crop rotations. This software package assumes that the grower can come up the necessary machines and manpower for any given crop and tillage proposal, while CROPBUDGET doesn't.

BESTCROP helped Dave Carey, Walla Walla, Wash., to decide between planting spring barley or cannery peas on one field in 1984. "I had a hunch that the barley would produce more net income," Carey recalls. "But I was wrong." Carey and Hooker plugged in Carey's estimate of barley prices at harvest, his costs for fuel and machine time, and his yield predictions. The printout showed that peas would net about 10 percent more per acre than barley. Then the cannery made the decision even easier by raising its offer on contract prices a bit, so Carey signed up to grow cannery peas.

"The cannery people wanted to make some copies of those printouts, too," Carey says.

Carey and the Hofers haven't yet bought their own computers. But the Hofers' accountant and tax consultant does have one. In addition, Jim Hofers' high-school-age son is studying computers and trying to convince Jim to buy one for use in farm accounting and for the son's homework.

Hooker says this kind of exposure to computers has helped growers appreciate the importance of getting more precise farm-account figures.

"The information coming out is only as good as the information supplied by the grower to put into the computer," Hooker adds.

Besides helping Hooker and his associates promote conservation tillage, the SCS computer has made it easier to maintain and update mailing lists for various SCS information programs. The computer also keeps the records needed to properly operate and maintain a fleet of cars and trucks, keeps personnel records, stores farm conservation plans, and so on.

And when enough farmers buy their own personal computers, the SCS computer could someday be pressed into additional service as a computerized bulletin board, Hooker adds. A grower could use his computer to get information out of the SCS computer by telephone modem, making the

SCS office a continuing computer connection for growers.

Other SCS offices across the United States offer computer connections for farmers. They provide services suited to local agriculture and local soil conservation needs. For example, the SCS office in Prosser, Wash., offers irrigation design assistance. The Jackson, Tenn., office offers grassland and cropland planning assistance, and so on. Many more area SCS offices will also enter the computer age in the near future. They'll build on the experiences of SCS computer pioneers.

Steve McGill,
regional editor, *The Furrow.*

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Automated Flood Warning System Nears Completion

Progress continues on Connecticut's automated flood warning system. (See article on pages 3-5 in the January 1985 issue of *Soil and Water Conservation News.)*

The system provides instantaneous rainfall and streamflow heights to a computer system network which can estimate what the flood stage will be and how long it will take to reach that stage. The system, when tied to the local civil emergency preparedness network, gives property owners time to take action before floods hit, greatly reducing flood damages.

By the end of October 1985, work was nearly complete on the statewide system of 21 automated precipitation gauges and the two local systems of three gauges each. The cylinders for housing the electronics and antennae had been installed and the disturbed area around them had been smoothed and seeded. The tubular housing for the gauges is armor plated to protect the equipment from vandalism, and a storage system for antifreeze protects it from freezing. A locking door was installed on each gauge to make it easy to maintain the equipment and still keep it secure.

All 27 gauges began sending radio signals in December to the National Weather Service's River Forecast Center in Bloomfield and the Connecticut Department of Environmental Protection (DEP) in Hartford.

In November, the two pilot communities of Southington and Norwich were involved in purchasing and installing computer hardware to receive and interpret radio signals from the precipitation gauges in their watersheds.

DEP's Forestry Unit will be monitoring data from six of the precipitation gauges that are equipped to also measure wind speed, wind direction, soil moisture, air temperature, and relative humidity. The Forestry Unit will use the information to evaluate the potential for forest fires. DEP provided about $3,000 to equip the gauges to collect the additional data.

Interviews with property owners in Norwich are complete and lists of actions that residents can take to protect their property at various flood stages have been prepared. Interviews and individual action plans for property owners in both Norwich and Southington and community emergency action plans are scheduled to be completed by September 1986.

Phil Renn, Soil Conservation Service water resources coordinator in Connecticut, said that the statewide system of gauges; the computer hardware at the River Forecast Center, DEP, and the two pilot communities; and individual and community action plans for reducing flood damages should all be ready by September 1986. Renn said it will probably take a few storm events for people to become accustomed to receiving the data and using it to tell residents how to respond.

SCS State conservationist in Connecticut, Philip Christensen, said that the primary purpose of the automated flood warning system is to reduce flood damages, but an added benefit is the increased public awareness of the proper use of floodplains. Christensen expects this awareness will prompt communities to stop any further development of floodplains.

Nancy M. Garlitz,
associate editor, *Soil and Water Conservation News,*
SCS, Washington, DC

Mountain Springs: A Source of Irrigation Water and Energy

A ranch family in western Nevada is capitalizing on a strong natural force—gravity. Gravity pulls the water through their irrigation systems, and gravity will also soon light their houses and run their appliances.

Herb Capurro operates the Big Canyon Ranch near Pyramid Lake with his brother George, nephew Allen, and sons. They use the mountain springs fed by snowmelt high in the Virginia Mountains not only to water their crops but soon to also generate electricity.

The Big Canyon Ranch covers 2,600 acres scattered among 30,000 acres of public land that is administered by the U.S. Department of the Interior's Bureau of Land Management (BLM). The Capurros run about 400 head of cattle on it under a BLM permit and are following a coordinated resource management plan.

The Capurros irrigate about 200 acres of alfalfa, orchardgrass, and native meadow grasses for hay scattered among 20 to 25 different fields. The Capurros sprinkle irrigate about two-thirds of the cropland and flood irrigate the rest. Both the sprinkler and flood irrigation systems are run entirely on gravity pressure.

Four buried pipelines, which begin 5,500 feet above sea level, carry snowmelt and spring water from the 8,000-foot-high Tule Ridge on the west side of the ranch. The water flows 2 miles to the Capurros' fields. The water flows free for about the first mile

before entering pipelines. Unused water eventually runs into Big Canyon Creek below the ranch and into the 115,000-acre Pyramid Lake, habitat of the Lahontan cutthroat trout.

The Capurros are cooperators with the Washoe–Storey Conservation District. The Soil Conservation Service has been working with the Capurros for 20 years. SCS has helped redesign their irrigation system and design the pipelines. The pipes are sized to deliver water in sufficient volume and pressure. The fall on most of the lines is 8 to 10 percent and as low as 4 percent on flatter fields.

SCS District Conservationist Richard MacDougall in Reno, Nev., said that the Capurros have been gradually replacing the original pipe installed in the 1940's with plastic pipe. In the higher areas they are also increasing the diameter of the pipe from 2 inches to 4 inches.

The Agricultural Stabilization and Conservation Service has provided cost sharing through the Agricultural Conservation Program.

One of the Capurros' objectives in redesigning the irrigation system is to move from a combination of sprinkler and flood irrigation to a more efficient all sprinkler system. They are getting about 55 percent efficiency with flood irrigation and 65 to 75 percent efficiency with the sprinkler system.

By increasing the diameter of pipe along some lines, the Capurros will also be able to operate a small hydraulic generator. For many years, the Capurros, like many ranchers in remote parts of Nevada, have been using a diesel generator to supply electricity for household use.

A small building houses two diesel generators near the three houses on the ranch. Herb Capurro said they mainly rely on the older generator he bought in 1954 and use the one purchased in 1974 as a backup power source. The older generator has one cylinder and uses two fly wheels. Capurro said it is the kind that was once used to power tugboats. It runs 700 revolutions per minute (rpm's) while most others run 1,000 to 3,600 rpm's.

The older generator is more reliable than the newer ones on the market, but it's difficult to find parts for and Capurro said he sometimes has to have parts made. Also it costs $12 to $15 a day for fuel, $360 to $450 a month, to run the one–cylinder generator.

If the Capurros can use their irrigation water to run a hydraulic generator, they will cut their power bill considerably.

Capurro said that the nearest power company electrical line is about 12 miles away. It would cost almost $500,000 to bring electricity in to the three houses from there, but only $15,000 for the hydroelectric plant, an investment that should pay for itself in about 3 years. Harry Knapp in California is designing the system.

The plan is to use a water wheel turned by water pressure from an irrigation line. This would power a generator wired to an electrical panel at the diesel generator building.

The generator requires the water wheel to make 400 to 500 rpm's. To deliver the water pressure that can turn the wheel at that speed, it's critical that the proper sized nozzle be used. The system the Capurros are considering will produce 10 kilowatts of power, while the diesel generator is producing 6 to 7 kilowatts.

The water used to turn the water wheel and power the hydroelectric generator will be returned to irrigation lines for watering fields below the power plant.

According to Charlie Welch, an SCS soil conservation technician in Reno, another option the Capurros are considering is using an in-line hydraulic generator that wouldn't require a water wheel.

The Capurro family has been operating the Big Canyon Ranch since the 1940's. Living on the remote ranch high in the mountains has made the family self-reliant and resourceful. Switching the lights on at night is not something they take for granted.

Nancy M. Garlitz,
associate editor, *Soil and Water Conservation News*,
SCS, Washington, DC

Far left, Richard MacDougall, SCS district conservationist (left), talks to Allen Capurro (center) and George Capurro about long-range management of their 2,600-acre ranch in western Nevada.
Near left, sprinklers run on gravity pressure from mountain springs.
Right, Herb Capurro inspects buckets on water wheel that may soon be used to generate electricity for domestic use on the Big Canyon Ranch.

SCS Develops Reservoir Operating Guides

Managing a reservoir in some Western States can be a juggling act for a reservoir operator. It seems that everybody wants water, but nobody wants too much. And the operator has no control over when and how much water will flow into the reservoir.

Most of the water comes as runoff in spring and early summer from melting snow in the mountains and rain. The amount of runoff each year is highly variable, but is almost always more than the reservoir can hold. Water must be stored and released later for some or all of the following uses: irrigation of agricultural land, production of hydroelectric power, consumption by cities and towns, and maintenance of fisheries, wildlife habitat, and recreation facilities. Downstream erosion and flooding must also be minimized.

Most operators have two basic tools to work with. The first is an outflow gate to regulate the release of water from the reservoir. The second is the streamflow predictions provided by the Soil Conservation Service and the National Weather Service. The challenge is to use the streamflow predictions to regulate the release of water at a rate that minimizes the uncontrolled spilling of excess water through the spillway channel, satisfies the demands of all water users downstream, and fills the reservoir by the end of the peak runoff season.

In a few States, SCS is developing individual operating guides to help reservoir managers to perform this task. In theory, these guides are similar to the conservation plans that SCS prepares for farmers. They are based on the concept that, to be applied effectively, natural resource data must first be interpreted for the specific situation.

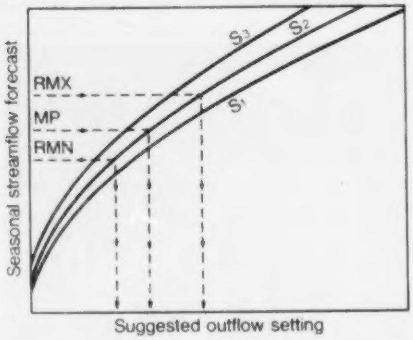
By using computer-generated rule curves on graphs, the guides advise the operator on what action to take in response to streamflow forecasts. First, the operator is provided with three runoff forecasts—most probable, reasonable minimum, and reasonable maximum. (See sample graph below left.) The operator locates these forecast values on the left-hand side of the graph and draws three lines horizontally to the specific rule curve corresponding to the volume of storage left to fill. From these three points on the rule curve, the operator then draws three lines down to the bottom of the graph to find a range of outflow rates from which to choose. Outflow settings selected in this manner allow the operator to fill the reservoir and maintain fairly constant release rates. The operator can also adjust the outflow as subsequent forecasts are received during the spring season or as local operating constraints change.

Without some sort of formal management plan, many operators simply fill their reservoirs as soon as possible in spring and send the rest of the runoff downstream. SCS is concerned because this "fill and spill" approach sometimes produces disastrous consequences. After they are full, reservoirs are unable to provide erosion or flood protection downstream.

One operating guide prepared by SCS in Montana is for Middle Creek Reservoir, south of Bozeman. This reservoir was built in 1951 by the construction of a dam on Hyalite Creek. It drains 27.4 square miles, has a useable capacity of 8,261 acre-feet, and has a maximum outflow of 800 cubic-feet per second (cfs). Elevation of the drainage area ranges from 6,722 feet above sea level at the dam to 10,299 feet at the highest mountain peak.

SCS prepared the operating guide in 1985 at the request of the Water Resources Division of the Montana Department of Natural Resources and Conservation (DNRC) and the Middle Creek Water Users Association (MCWUA). Approximately 80 members of MCWUA have about 110 contracts to buy water from the reservoir, which is operated and controlled by the association under agreement with Montana's

Reservoir Operations Planning Curve



In this simplified version, the curves S_1, S_2, and S_3 are for different capacities for additional water storage. The graph suggests an outflow setting for each of the three streamflow forecasts: reasonable maximum (RMX), most probable (MP), and reasonable minimum (RMN).

Hyalite Creek drainage area is the source of the melting snow which feeds Middle Creek Reservoir south of Bozeman, Mont.

Photo by Phil Farnes.

DNRC and USDA's Forest Service.

The guide gives top priority to satisfying all of the water contracts, which requires a minimum outflow of approximately 125 cfs. It recognizes that the best way to do this is to fill the reservoir during the peak runoff season and have it full going into the season of peak demand. Other objectives include keeping the wildlife habitat and fisheries vital downstream by maintaining a minimum streamflow of at least 25 cfs, reducing the risk of bank erosion and flood damage to roads by keeping outflow below 400 cfs, and ensuring that water storage doesn't dip below 2,750 acre-feet to sustain some 20,000 hours of sport fishing each year in the reservoir.

Melting winter snowpack and spring rain are the major sources of water for Middle Creek Reservoir. Snow survey data collected by SCS at seven locations in the drainage area provide accurate information on the amount of snowpack, but temperatures during snowmelt and spring precipitation must be predicted using probabilities based on previous years of data. There is an 80 percent likelihood that the runoff received will be between the forecasts for the reasonable maximum and reasonable minimum.

In low-snowpack years, streamflow drops rapidly after the snowpack has melted and there is little opportunity to increase the amount of water stored if precipitation is less than normal. In addition, water demands downstream are usually higher in low-snowpack years. In average-snowpack years, the streamflow holds up better because the snowpack takes longer to melt. Even if spring precipitation is lower than normal, some of the runoff can still be stored without affecting downstream uses. In high-snowpack years, the runoff usually holds up even if spring precipitation is lower than normal. The opportunity to increase storage lasts longer, and it's best to store much of the heavy snowmelt because long-duration, above-average flows downstream could cause extensive channel erosion.

Here is how the guide would work for a relatively normal year. March 1 streamflow forecasts indicate that the reservoir storage, which is a little under half full, is at a satisfactory level for the forecasted spring runoff. Outflow is allowed to fluctuate with the inflow.

New forecasts are received on April 1 and entered into the rule curves. As a result, outflow is adjusted to a fixed level while inflow rapidly increases with spring runoff. As the water level rises in the reservoir, the outflow remains relatively constant.

SCS specialists use data collected at remote snow survey stations, such as this one on Lick Creek south of Bozeman, to develop individual operating guides for reservoir managers.

Photo by Phil Farnes.

By May 15 the reservoir is nearly three-quarters full, and new forecasts suggest the outflow be increased to a rate still less than inflow. As additional snow survey data are received, the outflow is increased a little more on May 20 and again on June 5 as the storage approaches nine-tenths capacity.

On June 25, a remote snow survey station transmits information that indicates the snowpack has completely melted at the higher elevations in the drainage area. This means the runoff has peaked, and in another 3 days—with the reservoir full—the inflow is down equal to the outflow.

Irrigation begins downstream, and on July 1 the outflow is set higher than the inflow for the first time. Demands for irrigation water continue to increase into August while the inflow returns to its pre-spring-runoff level. In the second half of August, the demand for irrigation water abates and the reservoir enters the fall one-quarter full.

Although the reservoir ended the season with less water in storage than it had at the beginning of the year (one-quarter, compared to nearly one-half capacity), the operation was a success because two important goals were achieved. The reservoir was full—briefly—by the time the snowpack melted, and there was enough water for irrigation during the summer. By adjusting the outflow slightly lower than the inflow during the fall and winter, the storage can probably be restored to nearly half full before spring.

"Basically, we're just showing the operators how to use the data that we've been providing," said Phil Farnes, supervisor of the SCS Snow Survey Program for Montana. "It used to be that when we told the operators they were going to receive 50 percent more runoff than usual, some would know what to do about it and some wouldn't. The operating guides help them decide what to do, based on their unique situation. We're recognizing that just as there are no two farms exactly alike, there are no two reservoirs exactly alike."

Bernard A. Shafer,
data analysis group leader, Snow Survey Program, West National Technical Center, SCS, Portland, Oreg.

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	22	National Arbor Day
May	1	International Land, Pasture, and Range Judging Contest
	4-11	Soil Stewardship Week
June	5	World Environment Day
September	21–27	National Farm Safety Week
	27	National Hunting and Fishing Day
October	5–11	National 4-H Week
	16	World Food Day
November	21–27	National Farm City Week

New Publications

Agriculture: Foundations, Principles, and Development

by J. R. Raeburn

With this book, the author attempts to provide an overall picture of agriculture that is useful as an introduction and as a general guide and reference. The introduction reviews nine questions that are central to the world's problems with agriculture. The author answers such questions as what does agriculture contribute to human welfare and what are the obstacles to future increases in foodstuff production?

The book is divided into 6 parts with a total of 23 chapters. Most chapters conclude with sections on references used, further readings, and questions and exercises the reader can complete.

Copies of this 329-page book are available for $29.95 from John Wiley & Sons, Inc., One Wiley Drive, Somerset, N.J. 08873.

Ecological Interactions in the Soil Environment: Plants, Microbes, and Animals

Edited by A. H. Fitter
with D. Atkinson, D. J. Read,
and M. B. Usher

This volume contains papers presented at a British Ecological Society meeting held in April 1984. The meeting brought together researchers on all aspects of the soil biota, from the roots through the various microbial groups to the soil fauna.

The chapters in the book are arranged in progression from studies on roots alone, to root-microbial, animal-microbial, and finally to more complex interactions.

Copies of this 451-page book are available for $57 from Blackwell Scientific Publications, Inc., P.O. Box 50009, Palo Alto, Calif. 94303.

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6/11

February 1986 Volume 6, Number 11

Soil and Water Conservation News

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013-2890.

Subscriptions
Send subscription orders to:
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Comments:
From the SCS Chief

Conservation Education—A Key Step in Natural Resource Conservation

The Soil Conservation Service joins hands with others—conservation districts, other natural resource agencies, teachers, teacher trainers, and conservation organizations for youths and adults—in conservation education.

Our efforts are aimed at building a conservation-minded society that understands that its actions have far-reaching effects on soil and water resources for future generations.

Also, we want to encourage people to use their knowledge in making decisions that will enhance soil, water, and other natural resources—in their back yards, on their farms and ranches, in their counties, in their States, and throughout the Nation and the world.

Achieving such far-reaching goals begins by taking one step at a time. Over time, and through close cooperation, SCS and the National Association of Conservation Districts (NACD) have taken impressive steps forward in promoting conservation education for people of all ages.

Within the last few months, SCS has assigned a full-time education coordinator to NACD. This person works under the general direction of the NACD Education and Youth Committee and with NACD's director of communications and other staff.

The main objective of the coordinator is to encourage districts to strengthen their conservation education efforts. One way is by providing districts with good ideas and techniques they can use in planning and carrying out a conservation education program.

Already in place is a data bank called the Library of Good Ideas that districts can access through NACD to learn what others are doing in activities such as fund raising, outdoor classrooms, field days, teacher workshops, and district youth boards. The data bank also includes information on how districts are using volunteers. Volunteers can be a tremendous asset in expanding district conservation education programs.

The education coordinator will also work with State soil conservation agencies, State departments of education, the Cooperative Extension Service, and others to promote conservation education activities in their programs and foster cooperation among them. Let's help them all be successful.

Just as we teach children to read and write, we must also teach them to be responsible stewards of natural resources. Both are too important to be left to chance.

Wilson Scaling

Cover: At the 1985 Boy Scout Jamboree, Soil Conservation Service National Cultural Resources Specialist Diane Gelburd points to remains of animals used by the Algonquin Indians and discusses past use of the land. See article on pages 6–7. (Photo by Tim McCabe, former photographer, SCS, Washington, DC.)

John R. Block
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

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Conservation Education

Conservation Education Award Winners

The National Association of Conservation Districts (NACD) and Deutz-Allis Corporation have announced the winners of their 1985 Conservation Education Awards Program. The program is open each year to full-time teachers in grades K-12 in the United States and its territories and to the Nation's 2,950 soil and water conservation districts. The purpose of the contest is to emphasize the value of conservation education in the schools and to recognize the most outstanding conservation education programs developed by teachers and conservation districts across the Nation.

Winning Teachers

Teacher-of-the-Year winner is Jim Rowley from Centerville High School in Centerville, Ohio. Rowley was cited by the judges for his humanistic approach to conservation education. "Progress toward solving even the biggest of problems can be made if you are willing to break the problem down into smaller, more manageable tasks," Rowley says. "If you are concerned about conservation education, you can volunteer to work with children in your own community. You may not be able to personally solve the soil erosion problem, but you can study its implications and become educated as to modern soil conservation practices. You may not be able to solve the food problem in Ethiopia, but you can make a difference in the life of one Ethiopian child."

Through research into the evolution of the African famine, for example, his students' interest and excitement generated citywide fundraising efforts last year which resulted in a $10,000 contribution to the Red Cross for its African Famine Relief Program.

Through Rowley's classes—attended last year by 250 senior students, or 45 percent of the graduating class—young people have raised money to purchase computer equipment for the school's Environmental Studies Center. Volunteer naturalists from his classes have guided more than 500 elementary students through district parks in the last 2 years, and other student volunteers have been assistant naturalists for the township park district's day camp.

The Wilderness Horizons Club, which Rowley sponsors at Centerville High, is a "study, travel, and service club concerned with those places that have escaped the impact of humans and their increasingly urbanized and industrialized world," he explains. "Club members will be introduced to backpacking, canoeing, and cross country skiing as means of exploring primitive areas." "No Trace" and minimum impact camping skills are emphasized, and members also participate in the planning and implementation of conservation projects in the Centerville-Washington Township area.

Jim Rowley's nomination was sponsored by the Montgomery County Soil and Water Conservation District, Trotwood, Ohio. He will receive $1,000 and an all-expense paid trip to the 1985 NACD National Convention in February in Nashville, Tenn.

Second-place honors went to third-grade team-teachers Jan Wieting and Larry Nelson of Gearhart Elementary School in Gearhart, Oreg., for their imaginative program.

A striking 40-foot wall mural, planned and painted by their students, stands outside the classroom, forming the background for a woodsy area of seedlings, flowers, and bushes planted by the students.

Inside the classroom as well, Jan Wieting and Larry Nelson's active imaginations and talent for innovation have made learning a friendly adventure. As an incentive to participation, the team has embraced the "sunship Earth" concept, which portrays Earth as a spaceship carrying passengers and crewmembers. Through their experiences in and outside the classroom, the children work enthusiastically toward the goal of becoming full-fledged members of the sunship crew. It's not hard to stay interested when mysterious backpacks appear, as they sometimes do, carrying information and assignments from "Sunship Earth Headquarters"—including, in one instance, a tape recording selecting the class to do an important study and detailing the children's responsibilities.

The sunship casts its spell into every corner of the classroom. One year-long writing project is the Sunship Earth Encyclopedia, a book that continues to grow throughout the year as the children research and compose new entries for it. A Sunship Earth News Board in each classroom is the focus for a collection of current events in conservation, which raises many subjects for discussion and activities.

Wieting and Nelson were nominated by

Award-winning teacher Jim Rowley totally developed the Centerville, Ohio, High School Environmental Studies Program. He sponsors the school's Wilderness Horizons Club whose members help plan and implement conservation projects in the Centerville-Washington Township area.

the Clatsop Soil and Water Conservation District, Astoria, Oreg. They will receive a $500 cash award during NACD's National Convention.

Regional winners in the conservation teacher category are: Northern Plains region, Ann Danner, Tara Heights Elementary, Papillon, Nebr.; South Central region, Joe Borland, Grant High School, Dry Prong, La.; Southeastern region, Dianne Bradshaw Hefner, Newton Conover Middle School, Newton, N.C.; Southwestern region, Kirk Goble, Alamosa High School, Alamosa, Colo.; and Northeastern region, Julian Kane, Garden City Senior High School, Garden City, N.Y.

Winning Districts

Cambria County Conservation District in Ebensburg, Pa., won First Place in the NACD/Deutz–Allis Conservation Education Awards Program. "Something for every school" in their county's 13 school districts is their motto. Trees for Arbor Day planting on school and strip mine areas, poster and essay contests, construction of outdoor study areas, a lending kit of library materials, newsletters, and teacher education workshops are all part of the strong program.

Full-time educational coordinator, Joseph Emerick, works with a 10-member education committee. One enthusiastic teacher commented, "The district's school programs provide hands-on opportunities to see and work with nature. This instills an attitude in the students that they can have an effect on the environment and not just read about it."

The district maintains its own hiking trail and outdoor learning center. And each year a trail and outdoor learning center are constructed at a selected county school. A complete inventory is made of the plants, wildlife, and soil at the site. Then a fall workshop is held for teachers to show them the potential of the new facility. A summer work crew hired by the district helps keep the areas in top-notch shape. And more than 200 county educators receive updated information in the monthly district environmental education newsletter.

In 1984, the district education coordinator worked with the biology department of a local high school to develop an intensive 6-week course for three classes in environmental education. To reach younger students, the district is revising the Minnesota "Ag–Stravaganza" program for students in K-6. In a special Junior Conservationist program, the district leads a 1-week environmental education program for students in grades 4-6. In addition, its coordinator reaches out to youth groups, ecology clubs, and other organizations interested in projects or presentations.

The Douglas County Conservation District from Lawrence, Kans., has won Second Place honors in the NACD/Deutz–Allis Conservation Education Awards Program.

An impressive 10-page supplement to the *Lawrence Journal World* newspaper in Lawrence, Kans., typifies the district's commitment to a strong, dynamic conservation education program. Featuring district winners in the Douglas County conservation contest, the supplement details a wide range of programs designed to interest and inspire local communities. It outlines the resource stewardship projects of the three winning families, and introduces the resources available through the district.

"Educational Efforts Transcend Classroom," the headline exclaims, describing Douglas County Conservation District's outdoor environmental education program. Developed at a local lake in cooperation with the U.S. Army Corps of Engineers, the project provides specific instructional opportunities for students in kindergarten through the sixth grade. It features a nature discovery trail, along with a presentation on dam construction and safety, while puppet shows, games, and hikes appeal to the younger children and illustrate the fundamentals of conservation.

The outdoor classroom experience complements a wide range of structured classroom activities presented to approximately 500 students and teachers at six schools throughout the system. Students participate in discussion sessions and slide shows, and a scale model conservation farm is available for investigation. Poster and limerick contests are additional incentives to learning conservation practices for elementary youngsters, while speech contests and career day presentations are designed to appeal to high school students.

A university volunteer program at the University of Kansas has been enormously successful, providing an unusual approach to conservation: students attending the university receive credit while doing volunteer work for the district. A 5-minute radio tape written and produced by a university volunteer was played on three local radio stations, for example, while another volunteer is earning credits through the Remote Sensing Department by developing a land cover map of the county from a Landsat image. And graduate-level seminars are conducted for natural resources planning and design classes, where topics for discussion may include conservation planning and application, use of soil surveys in the design process, sediment damages, and organized watersheds.

The two winning districts will be recognized at NACD's annual convention.

Other regional winners are: Pacific region, Gem Soil and Water Conservation District, Emmett, Idaho; Southwestern region, Carlsbad Soil and Water Conservation District, Carlsbad, N. Mex.; North Central region, Licking County Soil and Water Conservation District, Newark, Ohio; South Central region, Pittsburg County Conservation District, McAlester, Okla.; and Southeastern region, Warren Soil Conservation District, McMinnville, Tenn.

Ann Cole,
director of communications, National Association of Conservation Districts, Washington, DC

Learning Activities Spring From Pennsylvania Farm

Tayamentasachta meant "never-ending waters" to the Delaware Indians. Today, it could mean "never-ending activities."

Tayamentasachta is a 60-acre farm near Greencastle, Pa., that was named for its bountiful spring. Since 1966, this farm has been owned and operated by the local school district as the Tayamentasachta Center for Environmental Studies.

The center provides a variety of activities for the community and enjoys widespread support. Activities range from environmental education courses to special community celebrations. Approximately 10,000 people participate in activities each year.

For teaching about the environment, the center has a woodlot, grasslands, areas for demonstrating strip farming and experimenting with plants, wildlife areas, a tree and shrub nursery, a walnut plantation, a colonial kitchen garden, and a weather station.

The spring itself provides a pond with 500 to 1,000 gallons of water per minute. The pond is used for aquatic studies and serves as a trout nursery. In a project sponsored by an association of local sportsmen, students each year raise about 4,000 trout for release in local streams. The pond also has nesting boxes for waterfowl.

Farm buildings include a mansion built in 1820 that contains a craft room, an ecology laboratory, a classroom, restored period rooms, and a natural and cultural history museum. A large brick and frame barn contains a workshop, toolshed, and storage area. The barn bays are used for large group activities.

The building complex also includes a Pennsylvania Dutch oven and smokehouse and a log cabin that was built by students to demonstrate early American domestic life. A windmill and a waterwheel were donated to the center to demonstrate alternative forms of energy.

About 4 miles of trails meander across the farm. One section of this trail system is a self-guided nature tour. Walkers, joggers, and high school cross-country runners regularly use the trails.

The center is used to teach students from kindergarten through the 12th grade about the environment. Educational activities are interdisciplinary and include instruction in science, math, English, social studies, home economics, art, vocational training, and other subjects. Regular classroom teachers are assisted in these activities by parent volunteers, high school students, and student aides. Government agencies such as the Soil Conservation Service provide additional assistance and expertise.

Many groups from the surrounding area —such as the Boy Scouts and Girl Scouts— use the center for various activities throughout the year. Nearby Shippensburg University uses the center to introduce graduate and undergraduate students to environmental education. Student teachers from the university are assigned to the center to gain experience teaching environmental education. The center also offers inservice training to teachers, administrators, and community leaders in environmental education, energy conservation, and the development of environmental curriculum and school sites.

Senior citizens from Chambersburg, Waynesboro, Greencastle, Fort Loudon, and Mennohaven use the center for programs such as the annual Apple Butter Day. On this day, fifth-grade students are teamed with senior citizens to learn how to plant apple trees and make apple butter, apple cider, and corn husk dolls. The children also learn to appreciate relationships with older people.

On one of their visits to the center, kindergarten and elementary students are given flower seeds to plant and grow in their classrooms. When the flowers are ready to be planted outside, they are returned to the center where the students plant them in flower gardens.

Other special events at the center include the Cumberland Life Festival, in which eighth-grade students demonstrate early American life styles for 2 days in May. To prepare for the festival, the students begin researching their projects in February.

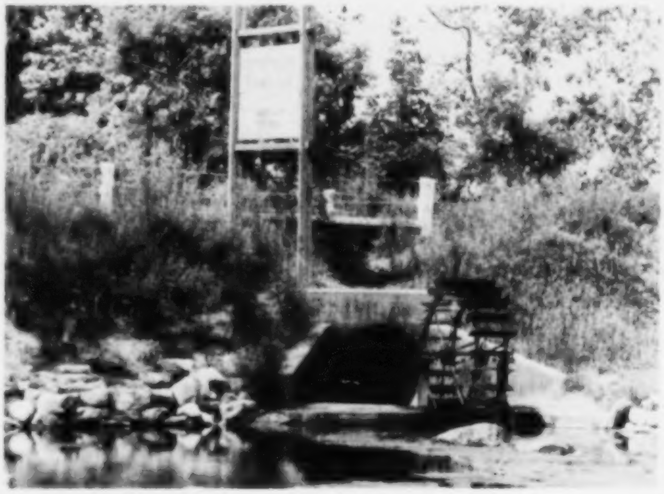
During December, the center hosts an early American Christmas that is open to the public. Senior citizens decorate the outside of the house for this event, and elementary and secondary art students decorate the interior. A high school choir sings carols.

Every 3 years, the community of Greencastle hosts Old Home Week. Present and former citizens get together during this week to remember past experiences and participate in dances, pageants, parades, concerts, competitions, and good fellowship. One day of the week is set aside for local craft persons to share their skills with the community.

The center is owned by the Greencastle-Antrim School District, and programs at the center are directed by a 15-member committee consisting of local community leaders, school administrators, school board members, teachers, students, and representatives from government agencies such as SCS. Committee members help host workshops and the special events.

Tayamentasachta is listed by the U.S. Department of the Interior on the National Register of Historic Places for its significance in American history, architecture, and cultural heritage.

Frederick E. Bubb,
public affairs specialist, SCS, Harrisburg, Pa.



The "never-ending spring" at Tayamentasachta Center for Environmental Studies near Greencastle, Pa., feeds a pond and trout raceways. Several alternative energy sources are displayed at the center, including a water wheel. The pond is stocked with fish and is heavily used by ducks and other wildlife.

Scouts and Conservation— The 1985 Jamboree

The 11th National Boy Scout Jamboree held at Fort A. P. Hill, near Fredericksburg, Va., July 24-30, 1985, was the site for some inspiring conservation demonstrations and hands-on activities. The Soil Conservation Service and the Hanover-Caroline Soil and Water Conservation District (SWCD) reached thousands of active, concerned boys with their resource conservation message.

One major exhibit at the jamboree was the Conservation Learning Trail which led to the Conservation Area. Small groups of the nearly 11,000 scouts who visited the Conservation Area first toured one of four trails with a professional conservationist. The trails had the same six stops set up along each. Each stop was designed to send a different environmental conservation message. The SCS stop stressed the interdependence of natural energy, air, soil, and water resources.

One scout, Paul Ellingstad from Vermillion, S.C., said of the Conservation Trail, "I learned a lot. It made me appreciate the environment and be more aware of conserving it. Of everything I've done here, I liked the Conservation Trail best."

The Conservation Trail led to the Conservation Demonstration Area with 22 exhibits by resource conservation agencies and organizations.

The 2-acre SCS "Conservation Is Your Future" exhibit was a favorite of scouts and adults. Each of the exhibit's nine stations related to conservation practices that scouts could adapt for use in their own communities.

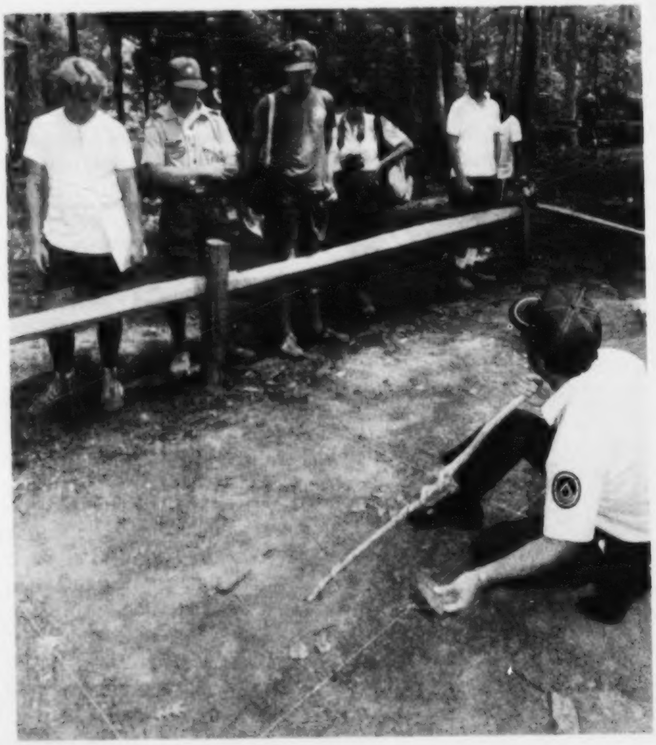
Exhibits showed how and why soil erosion occurs, how it affects the environment, and what can be done to control it. Runoff boxes were used to demonstrate how vegetative cover can reduce soil loss. Scouts also learned how certain soils are suitable for some land uses and unsuitable for others.

Scouts and visitors walked through a conservation vegetable garden to look at conservation practices such as mulching, contour farming, grassed waterways, and conservation tillage. Wildlife plantings and habitat were also discussed.

Scouts were surprised to see a coastal sand dune in the woods. They learned how dunes are damaged by human activities and how certain plants can be used to stabilize shifting dune sands. Samples of these plants had been planted on the dune and labeled. Many scouts said the station inspired them to plan projects to save the dunes back home.

After looking at five soil monoliths representing local soils and discussing how soil is formed from bedrock, scouts moved to a station where they built their own soil profile in a 6-inch plastic tube. The scouts carefully tamped small amounts of bedrock, parent material, subsoil, and topsoil into the tubes and sealed them. The mini-soil profiles that scouts took home will remind them of the conservation exhibits and what they learned about protecting natural resources.

From the soil tables, scouts walked to a



At left, Norman Wilson, SCS State forester in Richmond, Va., talks to scouts and visitors at the 1985 National Boy Scout Jamboree at Fort A. P. Hill about a model of an archeological site and what it reveals about the farming practices of American Indians 600 years ago.
Above, an SCS display shows plants that can stabilize dunes.

Photo, left, by Tim McCabe, former photographer, SCS, Washington, DC.

Photo, above, by Helen Jeter, public affairs specialist, SCS, Richmond, Va.

model of an archeological site. A guide discussed conservation practices of the American Indians in the 14th century. Scouts learned that long before the colonists settled here, Indians had practiced crop rotation to rest fields, restore soil nutrients, and prevent soil erosion.

Two model homes showed the contrast between the effects of good and bad resource management. The conservation homeowner had used simple and inexpensive conservation techniques and plantings to develop a pleasant environment and attract wildlife. The homesite had good grass cover, a diversion to prevent rainwater from entering the basement, and tile to take water from the downspout away from the house to a rock-lined pool.

On the other hand, the neglected homesite was identified by scouts as an environmental problem. A cracked house foundation, damaged shrubs, bare spots in the lawn, and effluent in a septic drain field placed in an unsuitable soil showed poor management of resources.

At the "rap area" scouts and visitors could talk with SCS personnel about the exhibits and use soil augers, probes, levels, and other tools used by SCS field staff.

Many of the more than 20,000 scouts and visitors who toured the Conservation Demonstration Area headed toward the Merit Badge Midway where nearly 100 booths featured skill and merit badges. SCS and the Hanover-Caroline SWCD sponsored two booths on the midway where they demonstrated principles of soil and water conservation.

At the booths scouts could get information on the types of projects and careers they could choose in resource conservation. Also, more than 90 scouts completed all of the requirements for the Soil and Water Conservation Merit Badge and almost 1,000 completed some of the requirements.

The Hanover-Caroline SWCD offered an extra incentive to scouts studying soil and water conservation. If a jamboree scout had his local conservation district certify that he earned the Soil and Water Conservation Merit Badge and completed one of the special projects listed on an SWCD brochure, the district provided a special conservation patch designed for the 1985 jamboree.

Edwin Weaver, a retired SCS district conservationist from Bloomsburg, Pa., traveled 270 miles to volunteer to help SCS and the SWCD with its jamboree exhibits. Said Weaver, "I feel that working with youth is the most important part of the SCS program because young people are our tomorrow."

Helen S. Jeter,
public affairs specialist, SCS, Richmond, Va.

Steve Hawks, information officer with the Division of Soil and Water Conservation of the Virginia Department of Conservation and Historic Resources, uses models to show scouts how conservation measures can reduce runoff and soil erosion.

Photo by Tim McCabe,
former photographer, SCS,
Washington, DC.

Scouts make mini-soil profiles to reinforce what they learned about soil formation.

Photo by Helen Jeter,
public affairs specialist,
SCS, Richmond, Va.

Students Study Native Use of Resources

"I wouldn't have wanted to live in those days—it was hard work to make arrowheads." This was the conclusion of one youngster after studying the Anasazi culture of 600 years ago in southwest Colorado.

The art of making arrowheads was just one of many aspects of the Anasazi culture studied last year by 7- to 11-year-old students at the Needham Elementary School in Durango, Colo. In a project sponsored by the Durango Resource Conservation and Development Area, approximately 100 students set out to learn all they could about the Anasazis—a people who once lived in the same area where the students live today.

The project began when each student in an independent study program at the school chose a different culture from around the world to study. One student chose the culture of the cliff-dwelling Anasazis. Other students in the program soon became interested in the Anasazis, and the project continued to grow until it included the second through fifth grades.

To provide the students with background information, an archaeologist from USDA's Forest Service came to the school and explained the purpose of archaeological digs, the methods of dating artifacts, and the history of the Anasazis. The students were then taken on a field trip to a place where an archaeological dig had taken place in years past. They got a feeling for life as it existed in the past by seeing not only pots and buildings but also human remains right under their feet.

"What is this?" one student asked, picking up a small object.

"It's a finger bone," explained the archaeologist.

"Do you mean people are buried right here?" another student asked incredulously.

In a later classroom session, archaeologists from Ft. Lewis College and the city of Durango described the stonework that the Anasazis developed over several hundred years. The students learned how the Anasazis carried stones from nearby canyon edges to build walls and how they split logs with stone axes to place on the roofs.

One student asked why small stones were pushed in between the larger ones. An archaeologist explained that this technique provided a stronger mortar than just plain mud.

During National Wildlife Week in March 1985, the local staff of the Soil Conservation Service discussed the soils, plants, and animals of the area with the students and described how the Anasazis used these resources. The students learned how the Anasazis converted the best soils from grassland to cropland and built diversions to carry water to nearby fields.

The students then visited a zoo to see the animals and habitats they had been told about. Many had studied such things as the differences between carnivorous, omnivorous, and herbivorous animals and the differences between terrestrial and aquatic habitats.

After a special permit was obtained from the Forest Service, the students were given a guided tour of the Anasazi pithouse ruins at Chimney Rock. There they were able to see the stonework they had been learning about.

The students studied how farming was done by hand instead of modern machines. The Anasazis used stones on sticks to make planting easier. Clay pots were used to store seeds and carry water.

The Anasazis dammed the small drainage areas and creeks at every flat point to store as much water as possible. When these areas went dry, they had to carry water 3 to 4 miles from the nearest river.

Later in the school year, an SCS archaeologist demonstrated the use of tools made of stone and antlers. The students also learned about the care of the tools and how Native Americans depended on them.

A large piece of black obsidian was broken apart to show the students how the Anasazis made spear points. The larger pieces of obsidian were used to make spear points; the pieces under about 6 grams were used to make arrowheads.

The students learned that the Anasazis eventually abandoned southwest Colorado possibly because of a drought that lasted several years.

Noel Wellborn,
RC&D coordinator, SCS, Durango, Colo.

Students from the Needham Elementary School in Durango, Colo., view Anasazi ruins at Mesa Verde National Monument, Cortez, Colo.

California Holds Its First Range Camp for Youth

Nine high school students from around California learned about range management at the State's first range camp for youth last June. The week-long camp was held at the University of California's Elkus 4-H Ranch near Half Moon Bay, south of San Francisco.

The participants were sponsored by seven resource conservation districts (RCD's): San Mateo County, Yolo County, Florin, Mojave Desert, Mariposa County, Fall River, and Santa Maria Valley. Some students had scholarships from Future Farmers of America chapters and 4-H clubs.

The California Section of the Society for Range Management, the California Association of Resource Conservation Districts, and the 4-H Cooperative Extension Service sponsored the event. Warren Peden, Soil Conservation Service State range conservationist in Davis, Calif., organized the range camp. Peden said that he knew how valuable the camps could be from his experience with SCS in Nebraska.

Campers spent most mornings indoors in formal instruction and spent afternoons in the field. They spent a day on an operating ranch, and a morning with a local rancher who visited the group to talk about the economics of ranching and how it affects decisionmaking. A range consultant talked to the campers about grazing systems.

Campers earned points based on an end-of-camp exam, plant identification contest, and a camp staff appraisal. While all campers received certificates of completion, the two with the most points—Mary Kimball of Woodland and Thomas Tilton, Jr., of Mariposa—received special certificates of merit and belt buckles. Kimball, the leading camper, also received a $50 U.S. Savings Bond from the San Mateo County RCD.

"Our main goal is to educate young people on the importance of the State's range resource and its proper management," Peden said. "Even if they don't pursue careers in agriculture, campers will at least have a better understanding of how rangeland and other resources must be carefully managed."

Camp instruction included range history in California, plant identification, range cattle and sheep production, range wildlife, ranch planning and operation, water development, fencing, prescribed fires, forest grazing, range management on public lands, and careers in range management.

Instructors were from the University of California's Berkeley and Davis campuses, the U.S. Department of Agriculture's Forest Service and Soil Conservation Service, and the California State Department of Forestry. Cooperative Extension farm advisors and Half Moon Bay rancher Pat Rookus also helped with instruction.

Another California range camp for youth is scheduled for July 7-11, 1986. Close to 30 young people are expected to attend.

Herb Nesmith,
public affairs specialist, SCS, Davis, Calif.

Permanent Soil Pits Help Students With Soil Identification

Some people recycle paper; some return bottles and cans. Now the Soil Conservation Service field office and the conservation district serving Grafton County, N.H., have found another reusable resource: soil pits.

When vocational agriculture students at Woodsville High School needed a place to train for soil judging events, teacher-coach Brian Van Gilder asked the local SCS and district office for site recommendations. SCS District Conservationist W. Michael Dannehy contacted the Grafton County Farm, and farm officials agreed to let the students use their property to establish permanent soil pits.

The county-operated farm is a cooperator with the conservation district and follows a conservation plan. The operation—dairy, small vegetables, and hogs—provides a significant part of the food needs for both the county-run prison and nursing home.

Dannehy and SCS Soil Scientist Kenneth E. Harward guided the vo-ag students as they opened two soil pits in a wooded area of the farm. Harward provided details on the soil conditions at the sites.

Not long afterward the high schoolers opened other pits and served as guides for a conservation field day for fifth-grade students countywide. The vo-ag group dug student-size pits and set up stations for natural resource professionals to make presentations. The stations were staffed by Cooperative Extension, State Forestry, and SCS specialists.

"This made a good practical exercise in soils identification for the students who also are on the vo-ag soil judging team," Dannehy said.

The permanent pits were used in another field day, this one directed at professionals, town officials, and others interested in septic systems. In addition to the dug pits, this program used an open cut in a hillside left from gravel mining. Harward and a representative of the New Hampshire Water Supply and Pollution Control Board presented the educational program for this event.

Pits located near the farm buildings or in areas likely to be used for cattle grazing were filled in. Pits intentionally left open—for practice sessions by the vo-ag team and for future use—were modified with a ramp at one end to allow easy entry and exit. These pits are only about 4 feet deep, as opposed to the 10-foot depth generally used in soils work.

The sides of the pits held firm and by late fall undergrowth had grown up near the demonstration site. One pit, in a wet area, was partially refilled. The other is ready for soil judging as soon as snow melts in spring.

The Grafton County Conservation District, which sponsored the field days, already is preparing to hold similar events in 1986.

Dottie Laber,
public affairs specialist, SCS, Durham, N.H.

Youth Board Develops Conservation Study Area

The Pittsburg County Conservation District Youth Board in Oklahoma is developing 20 acres of rural agricultural land into an outdoor classroom to be used by local schools and other groups to study resource conservation, wildlife, biology, and other subjects.

James Murrin, father of youth board member Robert Murrin, donated use of the land to the board.

Soil Conservation Service staff at the McAlester field office and Mike Mass, district manager and youth board advisor, are helping the board's 10 high school students to develop and apply a plan for managing and improving the 20-acre area.

The youth board has applied for and received funds from several sources. For example, through its nongame program, the Oklahoma Department of Wildlife Conservation awarded the group a grant of $400. The grant money was used to pay for fencing part of the area for wildlife and constructing several bird, squirrel, and wood duck houses.

Another part of the plan is the reclamation of an old gas well site. The area was left bare, and erosion had carved a large gully. To stabilize the gully, a local contractor donated his services to build a small earthen dam with a pipe through it. The area was then shaped and seeded.

This project not only stops the gully from eating back into a hill on the site but also demonstrates a common conservation practice for reclaiming damaged areas.

Local Cub Scouts helped to plant three rows of trees to form a windbreak on the study area. Just south of the windbreak the youth board plans to measure off a 1-acre plot. "Most people don't know just how big an acre is, and this plot will be used to give them a better idea of the size," said Robert Murrin.

"We also intend to install a freeze-proof tank behind the existing farm pond, set up a plant identification site, display old farm equipment which was used to farm this area 50 years ago, and develop other areas that teachers can use with their classes," said Murrin.

The purpose of the freeze-proof tank is to provide a continuous source of water for livestock in winter. The water is kept from freezing by the combination of special design, partial burial of the tank, and continuous flow of water. Livestock owners will be able to see a freeze-proof tank in operation at the conservation study area.

"This project is teaching the youth board a lot about caring for the land, and hundreds of students and adults will benefit from their work," said Mike Mass.

The National Association of Conservation Districts has named the Pittsburg County Conservation District Youth Board winner of the 1985 youth board contest. The board is being honored for its work on the conservation area and other activities to promote the wise use of our natural resources.

F. Dwain Phillips,
public affairs specialist, SCS, Stillwater, Okla.

At left, Pittsburg County Conservation District youth board members, Mike Shropshire (left) and Dorothy Atkins, work on fence around the wildlife habitat area that the board developed under the guidance of District Manager Mike Mass (right).
At right, youth board members, Robert Murrin and Cynthia Bernardi install a blue bird box.

Videotape Saves Speaker's Day

Sometimes the best way to learn about a new technology is to go back to school. All it took for me to appreciate the potential uses of videotape was a trip back to the eighth grade and a sore throat.

In my role as district conservationist for the Soil Conservation Service, I often get the opportunity to speak to groups in and around Glendive, Mont. Not only is this part of my job, but I sincerely believe in soil conservation and enjoy telling others—particularly young people—about it.

One day during National Wildlife Week last year, I was scheduled to give six 45-minute presentations to the eighth-graders at the local Washington School. This was a fairly big order, but I thought I could accomplish it simply by giving the same presentation six times.

For each group of students, I planned to show the slide show "Limits" by SCS and then talk and show slides about local resource and erosion problems. This would be followed by a question-and-answer period.

What I hadn't planned on was a sore throat. My throat was so sore on that day that it soon became clear that my voice would not last for all six presentations.

After hearing me struggle through the first presentation, Mrs. Verna Carpenter, the eighth-grade science teacher, suggested that we use the school's videotaping equipment to tape the next presentation for showing to the rest of the classes. Mrs. Carpenter, whose husband is a farmer, had planned a week of school activities on the theme "Soil: We Can't Grow Without It" and was determined to carry it out.

We decided to give it a try. I mustered up what little voice I had left and gave the best presentation I could in front of the video camera for the second group of students. The video tape of this presentation was then played for the four remaining classes. I still helped with the slides, but saved my voice for the question-and-answer periods at the end of the video presentations.

In all, about 165 students saw the presentation—either live or on tape—that day. And, judging by the many enthusiastic questions the students asked, they paid as much attention to the video version as they did to my live performance.

So, if you ask me, there are a lot of potential uses for videotape. It may not cure your sore throat, but it can lighten your speaking load. I learned this in school the other day.

Mike Carlson,
district conservationist, SCS, Glendive, Mont.

Flood-Control Lake Fosters Nature Center

One project often leads to another. In Bucks County, Pa., a new lake led to a new park, which led to a new nature center that attracts 28,000 people a year.

A decade ago, the Peace Valley Nature Center was little more than an empty dog kennel. Today it is the center of an extensive environmental education program on the shores of Lake Galena.

The construction of Lake Galena was a cooperative project cost shared by the Soil Conservation Service through the Watershed Protection and Flood Prevention Act, Public Law–566. This 365-acre lake was designed primarily for flood control on the north branch of Neshaminy Creek. The project included development of recreational facilities in the 1,500-acre Peace Valley Park surrounding the lake.

While SCS and the County Parks and Recreation Department were working on the basic recreational facilities, the county commissioners decided to set aside 300 acres of the park for a nature center. Included were 20 acres of the lake for aquatic studies. The nature center and the park were tied together by a land management conservation plan that requires the cooperative efforts of local, State, and Federal agencies.

Carolyn Jarin, who was already living in the park, saw opportunities to develop an environmental education program. The success of her early efforts convinced the county commissioners to hire her under the Comprehensive Employment and Training Act (CETA) as a park naturalist. They gave her a small budget that led to an expansion of the nature center.

In the early years, the nature center operated out of the converted dog kennel. In 1980, the county received a matching-funds grant of $36,000 from the U.S. Department of Energy for a new solar addition. As the local contribution, the Parks and Recreation Department provided the labor to build the addition. It is used to demonstrate solar energy and includes a 1,200-square-foot meeting, observation, and exhibit room; a greenhouse; and a waterless toilet.

Programs at the center include environmental education for all 4th and 10th graders in the Central Bucks School District's science curriculum; bird observation and nature walks; a course for training naturalist aides; classes for Scouts, 4–H groups, preschoolers, and adults; special programs for the visually, mentally, and physically handicapped; and seasonal "moon walks" and star watches.

Jarin runs the center with two assistant naturalists and 20 to 30 volunteers. The volunteers work about 6,500 hours per year.

Many of the volunteers are members of the Friends of Peace Valley Nature Center, Inc., a group organized in 1975 to supplement the staffing, funding, and programming at the center. This organization consists of about 400 family and individual members who raise about $28,000 a year to pay the salary of one assistant naturalist and buy educational materials and supplies.

Other organizations that contribute to and use the center include the Audubon Society, the Philadelphia Academy of Natural Sciences, the YWCA, the Bucks County Association of the Blind, the Buxmont Solar Energy Association, local garden clubs, and private schools.

Jarin has been recognized locally and statewide for her contributions in environmental education. She has been named "Employee of the Year" by the Parks and Recreation Department and "Outstanding Conservation Educator" by the Pennsylvania Association of Conservation District Directors. She has also received the "Conservation and Wildlife Award" from the Audubon Society.

David Tindall,
district conservationist, SCS, Doylestown, Pa.

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New Publications

Reclamation Planning for Coal-Mined Lands: A Selective Bibliography

Compiled by Rolfe D. Mandel
and M. Elizabeth Hines

The Surface Mining Control and Reclamation Act, signed into law in August 1977, charged the coal industry with the responsibility to "restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses . . . ." This bibliography focuses on the literature which describes "the existing and evolving reclamation technology for coal-mined lands."

Divided into six sections it covers: general information, regional perspectives for land reclamation, revegetating mined lands, reclamation and land use, reclaiming lands for fish and wildlife, and innovative reclamation techniques. This 343-citation bibliography is comprehensively indexed by subject and keyword. Most of the entries were published between 1970 and 1984, with a few more recent articles cited.

Reclamation Planning for Coal-Mined Lands: A Selective Bibliography is available for $10 (plus $2 for postage and handling) from the Council of Planning Librarians, 1313 East 60th Street, Chicago, Ill. 60637–2897.

Geotechnical Engineering Techniques and Practices

by Roy E. Hunt

This practical guide was written for on-the-job civil engineers and construction professionals who need quick, reliable solutions to the common geotechnical problems of project planning and construction. It will help them to recognize, evaluate, analyze, and resolve problems—in both rock and soil—with a minimum of time and money. The author gives expert advice on methods for anticipating and avoiding problems, and he explains how to solve those that do arise quickly and efficiently.

Thorough discussions are devoted to such topics as the common causes of construction failures, geologic accidents, the hydraulic properties of ground water and seepage control methods, the strength of geologic materials and failure criteria, and soil interaction with foundations and retaining walls. Also discussed are such subjects as deformation in geologic materials, site planning and preparation, shallow and deep foundations on soils and on rock, slope and embankment stability problems and risks, surface retaining structures, and support and performance monitoring.

This 729-page publication is available for $59.95 from McGraw–Hill Book Company, 1221 Avenue of the Americas, New York, N.Y. 10020.

Save Soil Systematically—Resource Management Systems for Midwestern Cropland

by the Soil Conservation Service

"The topsoil of much midwestern cropland is eroding at alarming rates. If the fields of the Midwest are to continue to produce crops to help feed the Nation and the world, erosion on those fields must be reduced to a rate that will not damage their long-term productivity." So states the introduction to this pamphlet.

Erosion can be controlled with a resource management system—a combination of conservation practices and management designed to make productive use of soil and water resources. SCS can help individual farmers and landowners plan and develop a system for their farms.

A resource management system may be simple or it may be complex, a combination of many individual practices. It might include such conservation practices as conservation tillage, contouring, crop rotations, stripcropping, terraces, diversions, windbreaks, water- and sediment-control basins, drainage systems, cover crops, grassed waterways, and integrated pest management.

For a copy of this full-color illustrated booklet (Program Aid 1366) or for more information on planning a resource management system, contact the local office of the Soil Conservation Service.

An Environmental Agenda for the Future

Edited by Robert Cahn

The authors of this book, all chief executive officers of some of America's leading environmental and conservation organizations, analyze in detail the most important environmental problems facing the world today. The problems the authors believe we should be concerned with are nuclear proliferation, population growth, energy strategies, private lands and agriculture, water resources, toxics and pollution control, wild living resources, public lands, protected land systems, urban environment, and international responsibilities.

Each problem is analyzed and then the authors give their strong policy recommendations for the changes needed to bring about a healthier, safer, more productive living environment now and in the future.

This 155-page paperback book is available for $5.95 from Island Press, Suite 300, 1718 Connecticut Avenue, NW., Washington, DC 20009.

Elementary Soil and Water Engineering

by Glenn O. Schwab
and Richard K. Frevert

This third edition, as in the first and second editions, has been written mainly for students in agriculture and related nonengineering fields at the college level. However, county Extension directors, contractors, farm managers, farmers, and others concerned with engineering problems on farmlands may find it a useful tool.

In addition to information on the design and layout of conservation practices, this book includes information on simple surveying and its application to field problems. Also included is information on surveying and the use of equipment; elementary hydrology; soil erosion control; water supply, structures, and storage on the farm; surface and subsurface drainage; irrigation; and watershed and farm planning. A list of references is given at the end of each chapter. Sample instrument survey field notes are given in applicable chapters to illustrate and to standardize the recording of data.

This 356-page text comes completely illustrated with graphs, charts, and photographs.

Elementary Soil and Water Engineering is available for $25.95 from John Wiley & Sons, Inc., One Wiley Drive, Somerset, N.J. 08873.

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by the Soil Conservation Service

Georgia: Washington and Wilkinson Counties.
Kansas: Clay County.
Nebraska: Cedar County and Valley County.
New Hampshire: Hillsborough County, West.
Pennsylvania: Warren and Forest Counties.
Texas: Johnson County.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986—490-922/20011

6/12

March 1986 Volume 6, Number 12

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service

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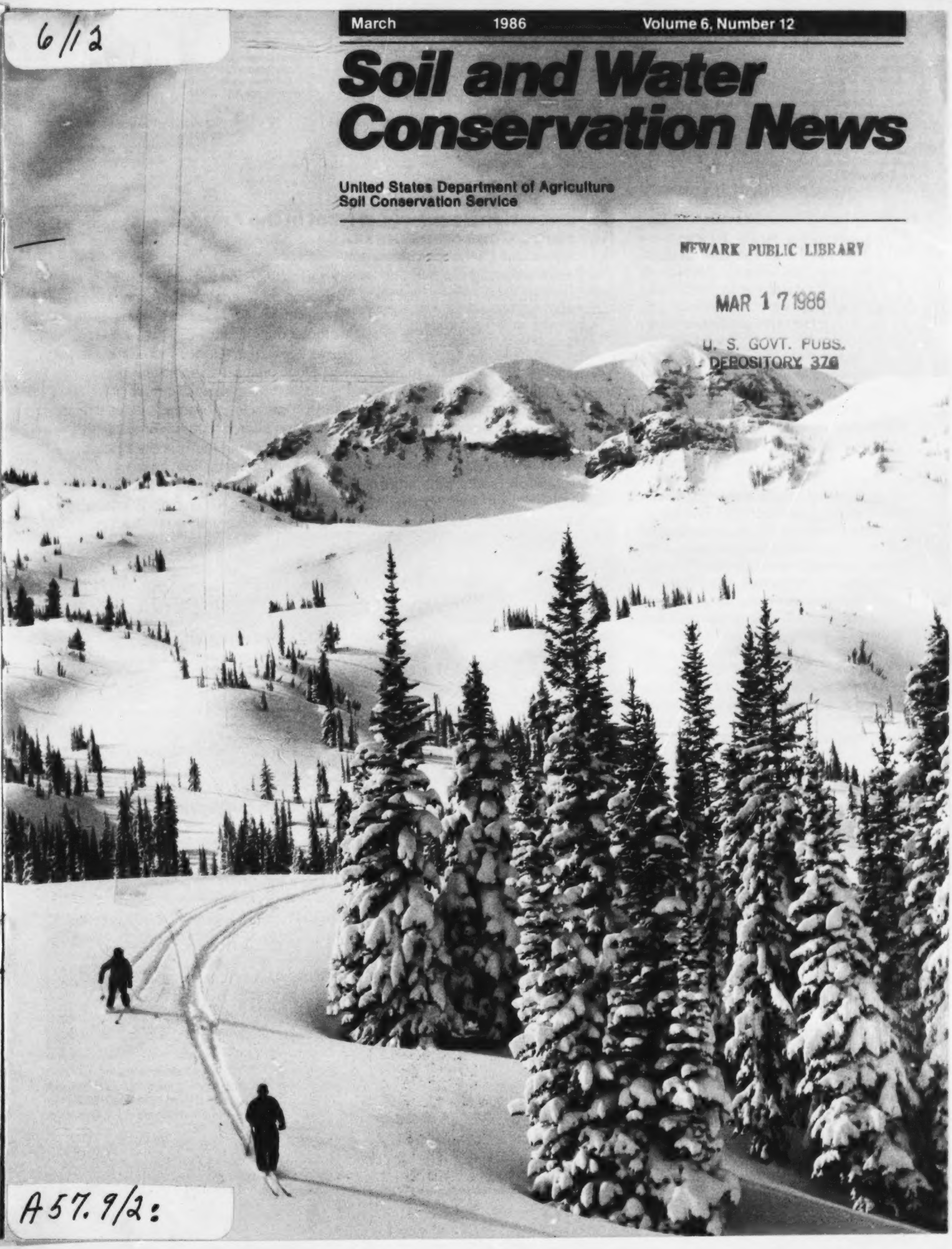

A57.9/2:

Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013-2890.

Subscriptions
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Comments:
From the SCS Chief

Conservation Reserve—A Shot in the Arm for Resource Conservation

The Conservation Reserve Program authorized by the Food Security Act of 1985 can be one of the best and most effective conservation programs this country has ever seen. It has the potential for removing from cultivation—for at least 10 years—as many as 40 to 45 million acres of highly erodible cropland.

The basic design for the Conservation Reserve Program—and much of the interest in its enactment—resulted from Soil Conservation Service data and staff work. I congratulate all those involved.

The Reserve was established as a voluntary program to help farmers prevent or control serious soil erosion now occurring on more than a third of America's cropland. Unchecked, this soil erosion would reduce the Nation's long-term capability to produce food and fiber, as well as increase sediment and other off-farm costs.

While reducing soil erosion, improving water quality, creating better habitat for fish and wildlife, and providing income support for farmers, the Reserve also will help adjust the production of some agricultural commodities currently in surplus. Thus, U.S. farm commodity programs and soil and water conservation efforts will harmonize with each other.

The "sodbuster," "swampbuster," and "conservation compliance" provisions of the Food Security Act disqualify farmers from receiving USDA farm program payments if they produce crops on certain lands and do not have a plan approved by the local conservation district. These are not attempts to dictate land use or interfere with private property rights. Rather, they are attempts to remove certain government incentives that lead to poor land use.

The Conservation Reserve and other conservation provisions will have a significant impact on the work of SCS and other U.S. Department of Agriculture agencies—the Agricultural Stabilization and Conservation Service (ASCS), Extension Service, Forest Service, and Farmers Home Administration—as well as State soil conservation and forestry agencies and local conservation districts.

SCS will determine eligible soils under the Act and help plan and apply conservation treatment called for in Conservation Reserve contracts. Establishing plant cover will be a big part of that conservation treatment.

The Food Security Act states that the conservation provisions will be administered through the use of conservation plans approved by local conservation districts in consultation with ASC county committees. This local involvement will help make the program a success.

As we move into these fast-paced times, it's important to keep in mind some of the basic principles that have made SCS a great agency over the last half century. One key has been our relationship with conservation districts.

Now, more than ever, it's vital that we work to maintain a capable and efficient field staff to help districts and their farmers and ranchers protect and improve natural resources.

I believe that SCS is taking the first steps into the most exciting and productive era of its history.

Wilson Scaling

Cover: For 50 years, the Soil Conservation Service has directed a cooperative snow survey and water-supply forecasting program. See article beginning on page 3.

Wilson Scaling, Chief
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Snow Survey Starts 51st Year

Many employees of the Soil Conservation Service enjoy skiing in the Western Mountains. For a few, however, crossing the winter landscape is more than recreation—it's a serious business. These employees are snow surveyors who travel the mountains by every means possible to inventory the snowpack that will provide next season's water.

"We have an important job to do and must respect the high country," said Jerry Beard, an SCS snow survey supervisor in Boise, Idaho. "The mountains are beautiful but unforgiving of mistakes, which is why all snow surveyors undergo special training in winter travel and safety."

About 75 percent of the streamflow in 11 Western States comes from mountain snowmelt. This water supply is so valuable—and variable—that SCS has directed a cooperative snow survey and water-supply forecasting program since 1935 to help water users and reservoir operators practice better water management.

Snow surveyors such as Beard, personnel from other agencies, and volunteers take several readings of some 1,450 snow courses each winter. These readings, augmented by other data, are used to make monthly streamflow forecasts during the snowmelt season.

The surveys give a good snapshot of snow conditions at a single point in time, but they are not frequent enough to detect rapid changes that can alter the water supply. "Much can happen between readings," said Beard. "There may be an intense storm or an unexpected warming at low elevations that is missed by the monthly survey. Accurate forecasts require real-time information."

To fill this information gap, SCS in recent years has developed a snow telemetry system (SNOTEL) to provide daily data. This system uses meteor-burst radio telemetry to transmit data from remote mountain sensors.

The meteor-burst technology uses the electrons in meteor trails 50 to 75 miles above the Earth to reflect or reradiate radio signals. These ionized trails are left by the billions of meteors that daily enter the atmosphere. Most trails last only a fraction of a second, but this interval is long enough to send VHF (very high frequency) radio signals over vast distances.

About 550 solar-powered SNOTEL sites are operating in the Western Mountains to record and temporarily store data on temperature, precipitation, and snow water content. Early each morning, master stations at Boise, Idaho, and Ogden, Utah, bounce signals off the meteor trails to these remote SNOTEL sites and receive each site's response. The two master stations then forward the data received to a central computer at the SCS West National Technical Center in Portland, Oreg., for storage and use in forecast preparation. SCS operates a similar system in Alaska in cooperation with other agencies.

Although greatly assisted by the new SNOTEL technology, snow surveyors still personally monitor the snowpack in 1,450 snow courses.

SNOTEL is the largest meteor-burst communications system in the world. Since being completed in 1980, it has made possible the elimination of many manual snowcourse readings that involved hazardous, expensive travel. The data it makes available have allowed hydrologists to apply computer simulation models to improve the reliability and timeliness of forecasts.

A variety of cooperators use SNOTEL data. After major snowmelt flooding in 1983, special funds were appropriated for the installation of 37 new sites and upgrading 63 existing sites in the Colorado River Basin to improve forecast capability. With this new SNOTEL information, management agencies such as the U.S. Department of the Interior's Bureau of Reclamation and the U.S. Army Corps of Engineers will be able to make river management decisions with greater confidence.

Streamflow predictions issued to the public are generated in the Centralized Forecasting System (CFS). This system, which is operated by minicomputer, contains a number of interactive programs, data bases, and analysis routines that allow hydrologists to rapidly compute runoff predictions from massive amounts of near-real-time data. It also provides SCS field personnel at 300 offices in the West and many cooperators with automated dial-up computer access to runoff projections as well as current snowpack, reservoir, precipitation, and streamflow summaries. The programs allow users to obtain current and historic climatic data. Other specialized computer programs available within the CFS framework include software for irrigation planning and reservoir operations.

Good water management is essential for most agriculture in the West. It requires accurate advance knowledge of the amount of water to be received and, for 50 years, snow surveys and water-supply forecasting by SCS have helped to provide this information.

David E. Johnson,
manager, Snow Survey Program, West National Technical Center, SCS, Portland, Oreg.

Landscaping to Conserve Water

As communities grow, their demand for water grows too. This presents problems for State and local governments everywhere, but more so in arid and semi-arid parts of the country where officials must wrangle with how to stretch already meager supplies of water.

One way communities in dry areas can conserve water is through xeriscaping—a new way to design and maintain the areas around houses and buildings. Taken from the Greek "xeros" meaning "dry," xeriscaping reduces energy costs as well as conserves water. It means using native grasses, shrubs, and trees instead of popular water-demanding plants that are better suited to higher rainfall areas.

The xeriscape concept has been adopted in parts of Colorado, Texas, and California and could have wide-reaching application in the growing communities of semi-arid northern Nevada. A group of professionals in landscaping, engineering, and resource conservation and concerned lay people have formed a Great Basin xeriscaping group in Reno, Nev., to increase citizens' awareness of the technique and demonstrate its use.

The group includes representatives of the Northern Nevada Native Plant Society, the Reno Parks & Recreation Department, the Nevada State Division of Forestry, the University of Nevada Department of Plant Science, the Washoe County Cooperative Extension Service, the Washoe-Storey Conservation District (CD), and the Soil Conservation Service.

Right now, the group's major effort is developing a 1¼-acre demonstration garden at the Sierra Pacific Power Company's new Sierra Plaza, a five-story office complex. The xeriscape garden will include turfgrass trial plots, models of landscaping alternatives for residential lots, and a collection of drought-tolerant plants.

Leader of the Nevada xeriscaping group and a district supervisor of the Washoe-Storey CD, Thomas A. Stille of Stille & Associates Landscape Architects & Planners in Reno, said that the dry landscape method involves good design, soil improvement, mulch, minimal turf, zoned irrigation, drought-tolerant plants, and regular maintenance.

According to Stille, one of the principal xeriscape design criteria is reducing the need for water. Incorporating organic matter into the soil is one way to do it. The organic matter helps hold moisture in sandy soil and helps water to penetrate clayey soil. Using plants that perform better in poor, sandy soils or clayey soils also reduces the need for watering, said Stille.

Mulches reduce evaporation, control weeds, and provide a cool root zone for plants. Organic mulches such as wood chips or bark eventually break down, also adding organic matter to the soil.

Turf is not only a heavy water user, but it is also expensive to maintain, said Stille. Although shrubs and ground cover require substantial labor the first year or two, after they are established they require far less water and care than turf. For small areas of turf in a xeriscape design, Stille suggests that homeowners consider tall fescues, buffalograss, blue grama, streambank wheatgrass, and some of the fine leaf fescues instead of the popular, but water-demanding, Kentucky bluegrass.

Automatic irrigation systems should be zoned to irrigate different areas according to their water requirements, said Stille. A small turf area should be on a different valve than a shrub bed, and an area on the north side of a two-story building should receive less water than an exposed west or south side. Drip irrigation systems are more efficient than sprinklers because of water loss to wind and evaporation. On a hot, windy afternoon, sprinklers can lose up to 60 percent of their efficiency.

There are many trees, shrubs, vines, and perennial flowers that have very low or low water requirements. Low-water-requiring plants will grow with an additional 3 to 7 inches of water, or just three good soakings a year, said Stille. Many plants native to the Great Basin, once established, will grow and flower without any additional water.

Careful management of a garden is especially important in the first 2 years. Irrigation systems must be fine tuned, plants must be checked for vigorous growth, and dead plants must be replaced. Proper fertilization and pest control measures are also important.

Said Stille, "Xeriscapes have the same

goals as any landscape or garden. They include reducing soil erosion; providing sheltered micro-climates; creating a more enjoyable environment; and adding color, variety, and interest to urban areas. The difference is that xeriscapes do it all with less water."

Currently, Reno residents' water use is not metered. But, local officials see metering as inevitable. With an estimated one-half of residential water use going to water landscapes, residents will soon have more at stake in reducing their water use.

Stille said that in cooperation with the research and development department of the Sierra Pacific Power Company, University of Nevada scientists, and others, the xeriscape demonstration garden will incorporate an important research effort. The main goal of the effort is to collect weather and soil data and analyze it to determine how efficient xeriscaping is under local conditions.

A weather station will measure wind, temperature, humidity, solar radiation, precipitation, and pan evaporation. These measurements will be used in estimating the consumptive use of water by plants. Twelve water meters will record water use in various parts of the garden. The water in the soil profile will be measured to determine how much water is actually being used by plants. The data collected will be sent to the university for analysis.

Stille says current plans are to have the monitoring hardware in place by summer. The data collected will be used by the Great Basin xeriscaping group in its public education efforts.

Through creative landscaping, Sierra Plaza's xeriscape will serve as a demonstration and research garden and as a model for water conservation in northern Nevada. Visitors will be able to inspect plants with varying water requirements, learn about new turf plants developed for their drought tolerance, and see some xeriscape designs they can use in their own landscapes.

Nancy M. Garlitz,
associate editor, *Soil and Water Conservation News*,
SCS, Washington, DC

Ranchers Harness Sun to Pump Water

Some ranches in Kansas have always had lots of sunshine but little water. By using the space-age technology of photovoltaics, however, several ranchers are now turning the sunshine into electricity and pumping water with it.

Over the past year, the Trego County Soil Conservation District has helped to install four solar-powered pumping stations. These stations are in remote areas of the county where the cost of installing conventional electric lines would be prohibitive.

The system being installed was developed by Eddie Bollig, a local conservation contractor, with assistance from Bill Crawford, district conservationist for the Soil Conservation Service. Bollig and Crawford began the project by obtaining information from the manufacturers of solar panels. They studied the various solar panels and pumps on the market and chose a combination that would work where the water table is relatively shallow, within about 12 feet of the soil surface. This makes the system suitable for about half of Trego County and a good deal of northwestern Kansas, which is on the edge of the Ogallala Aquifer. Springs in the aquifer are good sources of water for the system.

Two of the solar units have been installed and are functioning extremely well in the 1,200-acre Triple Creek area northeast of WaKeeney. This is an area of dry grassland where pit ponds have been used to water cattle. Years ago it was necessary to haul water to the cattle.

"This operation could replace pit ponds, or it could supplement them," said Crawford. "It could be used in the winter when the ponds are frozen over."

The solar panel is set up on a metal stand to keep it from being disturbed by cattle. It is capable of delivering a 12-volt, 2-ampere current. The pump, which is placed inside a casing below the solar panel, draws 1 ampere of current. It brings water up from the water table and pumps it through a pipe into a stockwater tank. When the tank is full, a float valve or float switch turns off the pump to conserve water. The same mechanism turns the pump back on when the water level in the tank gets low. A 12-volt battery can be added to store current for use on cloudy days.

According to its developers, this system is an improvement over the traditional windmill. "With a windmill, when the wind doesn't blow you are out of water," said Crawford. The solar panel and pump cost from $500 to $1,000, about one-third the cost of a new windmill and conventional well.

"Windmills provide more power than you really need," said Marvin Lynd, one of the ranchers who has installed the system. "You can't move a windmill. This operation is portable, and having it movable is a very practical point."

Another advantage of the solar operation is that water can be kept underground until needed. This helps to keep the water free of surface contamination and reduces evaporation. It also keeps the water supply from freezing in winter.

Similar solar systems have been established in Meade and Phillips Counties. The Kansas Fish and Game Commission has one in use and plans to install a larger one in the Garden City area.

"It started in Trego County but will apply to a big share of Kansas," Crawford said. "I think it will really catch on."

Although the system apparently requires little maintenance, Crawford acknowledged that its long-term reliability has yet to be established, especially under winter conditions. "There are still a few bugs to work out," he said. "But we think solar power will prove to be the simplest and most economical means of providing water in remote locations."

Laurie Evans,
staff writer, *Western Kansas World*, WaKeeney, Kans.

Flood-Control Structure Fits Community Needs

You don't build a flood-control dam in the middle of a village. Not in Deposit, N.Y., you don't. Your assignment, if you are an engineer for the Soil Conservation Service, is to protect the community from flooding without moving a single building.

SCS engineers accepted this assignment. In response to community concerns, they designed an innovative structure that not only protects the community from floodwaters but also fits into the surrounding neighborhood.

Deposit is located in New York's Southern Tier, a region of steep hills and narrow agricultural valleys. Flooding has been a problem here ever since the village began as a logging depot in the 1850's. In recent years, damages have risen to about $70,000 a year, affecting as many as 179 homes and 32 businesses. Damage has been particularly bad in a residential section along Elm Street, where Big Hollow Creek and Butler Brook converge and flow west to the Delaware River.

In 1983, the village asked SCS to help control the flooding. Stream flooding of this type is usually controlled by building a flood-control dam or widening the existing channel. Because the two streams came together in a heavily populated part of the village, however, neither of these solutions was feasible.

The engineers went to their drawing boards. They were presented with complex engineering considerations that required a special design. They also knew they had to design a structure that was not very expensive and involved little or no building relocation.

Local residents were especially concerned about the visual impact of the project on their neighborhood. "We had to worry about what we were going to have to live with," said Pete Hempstead, chairman of the Watershed Steering Committee.

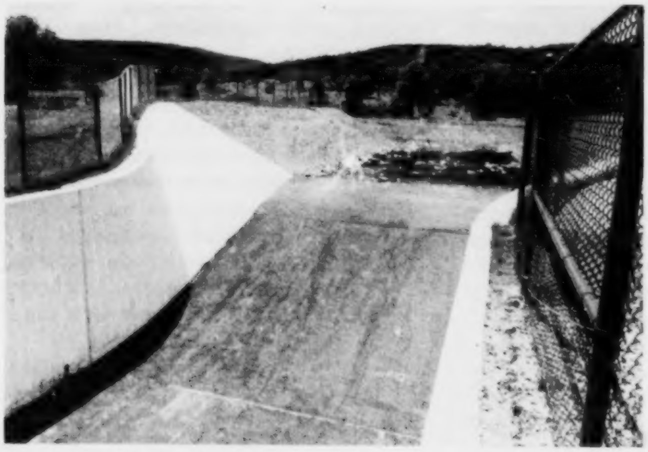
Rerouting the stream to the river appeared to be the best solution. This could be done by digging a narrow outlet channel through the residential area where the homes are close together. A special transition structure would be needed, however, to funnel floodwater from the wide earthen channel into the narrow concrete outlet channel.

The transition structure would have to keep the surface of the floodwater as low as possible in the outlet channel. To accomplish this, the engineers designed a concrete, fan-shaped structure with curved sides that provides a smooth, uniform change in bottom width, side slope, and elevation.

Building the transition structure required 212 cubic yards of concrete and 20 tons of steel reinforcement. Because this structure is unique for the site conditions, the contractor had to develop new construction methods. The inside and outside sidewall forms were anchored to the floor of the structure. The surface was made smooth by forming the inside faces with plywood.

The finished transition structure is 60 feet long and carries water down a 5.5-foot change in elevation. Floodwater enters the transition structure from the 38-foot-wide trapezoidal earth channel at a speed of about 6 feet per second. It gradually accelerates and enters the 22-foot-wide rectangular concrete channel at about 20 feet per second.

Upstream from the transition structure, two dikes were built along Big Hollow Creek and Butler Brook to protect adjacent properties, including a high school and offices of a power company. The dikes guide floodwater to a holding area, which between flood times is a grassy, landscaped depression. From there, the floodwater flows through the transition structure and the outlet channel to the river.



A transition structure was built to smoothly funnel floodwater into the narrow concrete outlet channel.

Fencing and landscaping help integrate the outlet channel into the Deposit, N.Y., neighborhood.

Photos by Karen Rusinski, visual information specialist, SCS, Syracuse, N.Y.

A new highway bridge had to be constructed where the channel was dug across New York State Route 10. This was accomplished with the cooperation of the Village of Deposit, the New York State Department of Transportation, and SCS. Deposit lies in two counties, Broome and Delaware, and assistance was provided by the soil and water conservation district in both.

The channel and transition structure were fenced, and the entire area was landscaped. According to Hempstead, village residents are pleased with the project. "No buildings had to be moved," he said, " and it looks good. Esthetically, it's symmetrical, functional, and integrated into the neighborhood by the landscaping design. Most important, it works."

The entire project, which is designed to protect the community from the most severe storm expected in 100 years, was completed in May 1985 at a cost of $1.4 million. Its first crucial test came 4 months later when Hurricane Gloria dumped more than 5 inches of rain in the area. There was no flooding.

"It worked beautifully," said Sara Kelsey, who lives next door to the project.

SCS is now looking into using this type of structure for two other flood-control projects in New York.

Donald Lake,
State conservation engineer, SCS, Syracuse, N.Y.

Controlling the Water Table in Eastern North Carolina

Plagued by excessive soil wetness, the farmers of eastern North Carolina have traditionally relied on drainage to save their crops. But now that uncontrolled drainage is being blamed for a number of water-related problems, several hundred farmers are using water conservation practices to develop a more controlled approach to water table management.

Much of the new interest in controlled drainage began in 1983, when the Soil Conservation Service established seven projects in eastern North Carolina to demonstrate how water conservation practices can be applied in preexisting drainage systems to manage the water table. Other farmers in the area soon began adopting water conservation plans for crop fields where they previously practiced only drainage.

The switch from uncontrolled to controlled drainage in the area has required fundamental changes in the attitudes of the people involved. First, the land users, many of whom have spent their working lives trying to keep their drainage systems free and flowing, had to be shown that it can sometimes be in their interest to restrict drainage. Second, SCS personnel had to be trained in how to best apply water conservation practices to improve water quality, reduce the use of ground water for irrigation, reduce the influence of agricultural freshwater runoff on primary saline nursery areas, and achieve the goals of the land users.

The drainage of cropland and forestland has historically been one of the most important components of land management in eastern North Carolina. The need for drainage has been strongly reinforced by repeated crop and forest losses over the years as a result of excessive soil wetness. As a result, the land users have installed a vast system of drainage canals and ditches.

Onsite, the uncontrolled drainage provided by this system has lowered the natural water table and reduced the ability of many soils to produce field crops and forest. Saltwater intrusion into farmland and forestland adjacent to estuaries and sounds has also become a common problem. Offsite, agricultural and silvicultural runoff is being blamed for the degradation of water quality in rivers, sounds, and primary saline nursery areas.

Another problem concerns irrigation. The principal source of irrigation water in the area has always been ground water drawn from the lower, highly productive aquifers. Very little emphasis has been placed on the development of surficial aquifers or on the use of water-control structures in the network of drainage canals to conserve surface water runoff as a source of irrigation water. This has contributed to demands being placed on the ground water resources that, if allowed to continue, could result in direct competition between the agricultural and urban-industrial communities for these limited water resources.

Recent research has shown that many of these water-related problems can be addressed by water conservation practices. For example, conservation practices can reduce some of the freshwater runoff blamed for the degradation of primary saline nursery areas. Water-control structures in major ditches and canals can control the quality and quantity of water entering these areas during critical periods. They can also be used to increase the amount of fresh water available, and some research suggests they can be used to increase the rate of recharge to aquifers. Water historically drained from a watershed can be conserved and stored in a surficial aquifer for use as irrigation water.

In addition to the research validating the use of water conservation practices, a computer model has been developed at North Carolina State University for designing total water management systems for individual fields. The model, "DRAINMOD," enables the designer to observe the performance of the water table in the field in relation to the weather, soil properties, tile or ditch spacings, surface drainage, and other conditions.

The land users in eastern North Carolina were aware of the water-related problems for which they were being blamed. They were also aware of some of the research that was underway, but they were not familiar with the concept of total water management. To them it did not seem practical that all the land users in a watershed could control the level of the water table for their various crops throughout the year.

Most SCS personnel in the area were also aware of the water-related problems and the ongoing research, but they had no experience in designing and managing total water management systems. Neither was there a program for addressing water-related issues, providing training, and coordinating agricultural agencies, researchers, and private industry.

In response, the SCS State office obtained funds through the Soil and Water Resources Conservation Act of 1977 (RCA) to establish the seven pilot projects to demonstrate the effectiveness of total water management systems. In April 1983, plans were made for establishing two projects in

Camden County, three in Hyde County, and two in Pamlico County.

During their first year of operation, these projects provided information about such things as the proper installation of water-control structures, drop structures, tubing, land grading and leveling, tile systems, and other water conservation practices. Valuable insight was acquired regarding management techniques, the placement of observation wells, pumping requirements, and the management of systems on a watershed scale.

A strong interagency network was formed. Personnel from SCS, the Extension Service, USDA's Agricultural Research Service, and private industry participated in water management meetings. This emphasis generated a keen interest among landowners.

Recognizing the value of total water management systems for addressing many water-related problems, especially water quality and saltwater intrusion into primary saline nursery areas, the State Agricultural Stabilization and Conservation (ASC) committee endorsed the use of water-control structures. Local ASC programs were amended to encourage farmers to participate.

Public opinion is being swayed, and, in some cases, the most adamant critics are becoming the strongest supporters of water table management through the use of water conservation practices. Many land users are becoming aware of the position of the water table with respect to the root zone of their crops and are studying the potential for storage and use of surface water runoff.

The original pilot projects, and many of the subsequent applications, are still being monitored to gather as much information as possible. Efforts thus far have confirmed that total water management systems are feasible for eastern North Carolina. The focus now is on learning how to manage these systems for the various soil types, water sources, crops, and locations within individual watersheds.

Dwane Hinson,
soil conservationist and RCA project manager, SCS, Edenton, N.C.

SCS Releases Seven Conservation Plants

A wildflower named in honor of the 50th anniversary of the Soil Conservation Service heads a list of seven new plant varieties sent into action against soil erosion in 1985. Years of testing by SCS and cooperating agencies have proven these plants exceptionally effective in reducing erosion and achieving other conservation goals.

The yellow-to-orange blooms of **'Golden Jubilee' black-eyed susan** (*Rudbeckia hirta*) make it particularly well suited for roadsides, mine sites, embankments, landfills, and other areas where visual attractiveness is desired. 'Golden Jubilee' is a reseeding biannual forb that is native to the Northeast. It is suited to a wide range of drainage conditions and soil textures.

The other new conservation plants are:

- **'Arbrook' perennial peanut** (*Arachis glabrata*), a perennial warm-season legume from Paraguay. 'Arbrook' is well adapted to the well-drained, sandy soils of Florida where its tall height (12-18 inches) and rapid regrowth in spring provide a reliable hay crop before the rainy season. It produces some flowers, but only an occasional subterranean nut. Propagation is by rhizomes.
- **'Tropic Coral' tall erythrina** (*Erythrina variegata*), a leguminous tree developed primarily as a windbreak to protect vegetable crops and farmsteads in Hawaii. Propagation is by planting cuttings directly in the soil. 'Tropic Coral' grows to be about 25 feet tall within 3 years and ultimately attains a height of 50 to 60 feet.
- **'Eldorado' engelmanndaisy** (*Engelmannia pinnatifida*), a deep-rooted, early-season forb that is suited to much of its native Texas. 'Eldorado' provides a forage very high in protein and digestibility, but is so relished by livestock and big game animals that it must be managed to prevent overgrazing.
- **'Comanche' partridge pea** (*Cassia fasciculata*), a warm-season legume useful as a ground cover for surface-mined areas and as a wildlife food plant. This annual can reseed and cover bare areas that receive about 19 inches or more of rainfall each year in its native Texas and Oklahoma.
- **'Cedar' Palmer penstemon** (*Penstemon palmerii*), a perennial evergreen that provides all-season forage diversity in the Western Mountains. 'Cedar' is well adapted to infertile soils and provides good ground cover for stabilizing disturbed soils and burned-over areas.
- **'Hatch' winterfat** (*Eurotia lanata*), an erect, half-shrub that provides abundant winter forage in the Western Mountains, particularly in years of heavy snow accumulation. It has a rapid growth rate that makes it valuable for stabilizing windblown soils and extremely barren areas caused by wildfires.

'Golden Jubilee' black-eyed susan.

New Publications

Nitrogen in Crop Production

Edited by Roland D. Hauck

In May 1982, a symposium was held to provide a comprehensive summary of the current knowledge about nitrogen as it relates to crop production. Nearly 100 scientists and technologists contributed their presentations to the symposium. Those presentations as well as several additional closely related topics comprise the chapters of this book.

It covers such topics as how plants use nitrogen; sources and supply of plant-available nitrogen; and management of crops, fertilizer and fertilizer amendments, manures and other waste products, plant residues, and soils for maximum, economic crop production.

Farm managers, agronomists, crop and soil scientists, crop ecologists, and cooperative extension specialists should find *Nitrogen in Crop Production* to be a valuable reference tool.

Copies of this book are available for $48 from American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America Headquarters Office, Attn: Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

Sodbusting: Land Use Change and Farm Programs

by the Economic Research Service

According to a study of recently converted land, the plowing up of land to grow erosive crops, or sodbusting, is not adding greatly to current soil losses but in the future may lead to increased erosion.

This report examines recent trends in conversion to cropland, the extent of soil erosion on newly converted land, and the likely impact of current farm programs and proposed sodbuster legislation on conversion. Under current sodbuster proposals an operator would become ineligible for price-support payments, farm storage facility loans, crop insurance, disaster payments, and insured or guaranteed loans for any crop year in which an annual crop was produced on a field which is predominantly highly erodible. This report investigates the implications of sodbuster legislation and analyzes the extent and location of recent conversion to cropland in total and on highly erodible land. Also, the economics of new conversion are examined and the likely effects of proposed sanctions are evaluated.

Single copies of this 29-page report are available from USDA/EMS, Room 208, 1301 New York Avenue, NW., Washington, DC 20005-4788.

Soil Micromorphology and Soil Classification

Edited by Lowell A. Douglas
and Michael L. Thompson

In the fall of 1982, a symposium, sponsored by the Soil Science Society of America (SSSA), was held to narrow the gap between the micro-morphologist and the soil classifier so that the soil classifier could use the additional knowledge about soil micromorphology for classification purposes. The papers were presented by recognized authorities in the field.

Soil micromorphology should be useful in separating cause from effect and explain why different soils form horizons the way they do, and what the different variations within the horizons mean.

Copies of this SSSA Special Publication Number 15 are available for $19 from SSSA Headquarters Office, Attn: Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

Soil Taxonomy—Achievements and Challenges

Edited by Robert B. Grossman,
Hari Eswaran,
and Richard H. Rust

This publication is dedicated to the memory of Dr. Guy D. Smith, a soil scientist who pioneered the soil classification system today known as the U.S. system of soil taxonomy. It contains papers presented at a symposium of the Soil Science Society of America (SSSA) in the fall of 1982. Thoughts are given on the history of soil taxonomy and its future, the role of classification in research planning and technology transfer, and its impact on the national cooperative soil survey.

Soil Taxonomy (SSSA Special Publication Number 14) is available for $12 from SSSA Headquarters Office, Attn: Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

Western Water Flows to the Cities

by John A. Folk-Williams,
Susan C. Fry,
and Lucy Hilgendorf

This is the third and final volume in the *Water in the West* series, published by the Western Network, a nonprofit organization that provides information about natural resource conflicts in the Western States.

Urban growth in seven Western States has resulted in strong competition for control of water resources in the region. While urban residents are concerned about paying for water projects that affect rural areas, those with a stake in rural resources—including farmers, Indian tribes, and environmentalists—worry about the environmental and economic impacts. A concern of both urban and rural groups is their ability to affect the decision-making process concerning the use of water. In an effort to be heard, some of these interest groups have brought litigation against local and State governments; others have used negotiating methods for influencing decisions about water.

This book offers 56 real-life case studies of conflict over a water issue involving a municipality. It outlines the development of the conflict, describes the methods being used to make decisions, and highlights the needs of water users in both urban and rural areas.

Western Water Flows to the Cities is a useful tool for water managers, public officials, attorneys, and concerned citizens—both urban and rural—who must confront and understand the water issues and conflicts in the West.

The book includes maps, a bibliography, a table of cases cited in the study, and an index.

Copies of the book are available for $25 (plus $2.50 shipping and handling) from Island Press, Order Department, Box 7, Covelo, Calif. 95428.

The Woodland Steward

by James R. Fazio

For many Americans, owning a piece of woodland is a lifelong dream. It is not only a dream for some but a responsibility to nurture, care, and protect the land's resources. This responsibility is often referred to as stewardship.

The author presents in this book a readable, straight forward approach to planning and carrying out a good woodland program. He has interviewed woodland owners all across the United States, and tells how they are getting the most out of their forests while improving them for the future.

The chapters include information on safety and how-to tips for the do-it-yourself logger; planning goals and objectives for how you will use your land; planting and improving the woodlot; protecting the forest from fire, insects, and diseases; harvesting and selling your timber; harvesting and marketing Christmas trees; holly production; maple sugaring as a hobby; and planning for wildlife.

Throughout the guide are names and addresses of government agencies, private organizations, and others who can provide information on some of the details in planning a good management program for your woodland.

This 211-page guide is chockfull of useful drawings, tables, and graphs.

Copies of *The Woodland Steward* are available for $14.95 (plus $1.95 postage and handling) from The Woodland Press, Box 3524 University Station, Moscow, Idaho 83843.

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Targeting Erosion Control: Delivering Technical and Financial Assistance

by James Nielson

In 1981, the U.S. Department of Agriculture initiated a national program to target conservation efforts on critical resource problem areas. The key agencies in designing and implementing the program are the Soil Conservation Service (SCS) and the Agricultural Stabilization and Conservation Service (ASCS). While USDA targeted several areas of resource problems, this research project addresses only programs for controlling water erosion on cropland. It studies the targeting program in detail in one State in each of the four major water erosion areas designated by USDA.

Data in this report are based mainly on personal interviews with 709 farmers, telephone surveys of SCS district conservationists and ASCS county executive directors, and personal interviews with conservation professionals and others. The report describes what was done in carrying out targeting programs at the national level and in selected States and counties, gives reactions to targeting from those who implemented it and those affected by it, presents findings on various facets of the organization and operation of the delivery system, and offers suggestions for improving the system.

Single copies of this report are available, while supplies last, from EMS Information, U.S. Department of Agriculture, Room 208, 1301 New York Avenue, NW., Washington, DC 20005-4788.

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April 1986 Volume 7, Number 1

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service

A57.9/2:

Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013-2890.

Subscriptions
Send subscription orders to:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Comments:

From the SCS Chief

Helping Small Family Farm and Ranch Operators Conserve Soil and Water

The Soil Conservation Service is responsible for carrying out a national progra of soil and water conservation. A major part of this program is working throug conservation districts to help farmers and ranchers plan and apply conservati practices on their land—regardless of the size of or the income from the operation.

SCS works with farmers and ranchers, large and small, who are ready, willi and able to apply a conservation system. Many of the low-income operators have soil erosion problems but very little extra money to apply the conservatio measures that are needed. As a result, during the past several years, SCS ha helped additional low-income farmers and ranchers conserve soil and water through the States' targeting of technical assistance.

Many low-income and limited resource farm operators have installed comple conservation systems with financial assistance provided by the Agricultural Stabilization and Conservation Service (ASCS) through the Agricultural Conservation Program. Cost-share funds have also been made available by State and local governments. In addition to the technical assistance it provide SCS has provided financial assistance for land treatment through its small watershed and Resource Conservation & Development programs.

As part of a departmentwide effort to further improve the delivery of service to small family farmers and ranchers, SCS sponsored a joint seminar with the predominately black, agricultural Land Grant Institutions and Tuskegee University at North Carolina A&T State University in March.

The predominately black Land Grant Institutions are an important source of agricultural research, education, and extension information for low-income an minority farmers of the rural South. SCS and the predominately black institutio are working together to determine the kinds of research that will best meet th production and conservation needs of small family farm and ranch operators. They need low-cost conservation systems that provide multiple benefits.

Well-planned cooperation among SCS, the predominately black Land Grant Institutions and Tuskegee University, the Cooperative Extension Service, ASCS and State and local governments can provide the kinds of information and assistance that small family farm and ranch operators need.

Wilson Scaling

Cover: Cotton rows on the contour, Tate County, Miss. (Photo by Tim McCabe, former photographer, SCS, Washington, DC.)

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

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Who Uses No-Till, Who Doesn't, and Why

Economics may play a larger role than conservation in farmers' decisions on whether to use no-till.

A new study has found that users and nonusers of no-till are equally concerned about conservation. Where they differ is in their perceptions of the economic costs and benefits of no-till.

The study was based on interviews with 200 farmers in the Palouse area of Washington and Oregon by rural sociologists at Washington State University and the University of Idaho. It compared the overall characteristics of farmers who have adopted no-till with those of farmers who have never used no-till.

"It would be a mistake for promoters of no-till to assume that this practice is being accepted by farmers mostly because of its conservation implications," the researchers concluded in results released last November. "Early users of no-till in the Palouse reported using it more for its economic appeal than because of a conservation ethic."

Early adopters of no-till, the study found, see the practice as a way of farming their land more efficiently. They are more likely than nonusers to believe that no-till will result in more net income per acre than conventional tillage.

Nonusers, on the other hand, said they will use no-till if the practice is found to reduce their use of fuel and farm labor, and if it will enable them to obtain crops every year. (Rotating a year of crops with a year of fallow is a common practice in the area.) They felt that more herbicides, fertilizers, and insecticides would be needed with no-till.

Those uncertain about whether they will ever adopt no-till cite equipment costs as one reason for being undecided. Weed control is another. The need for better weed control is a major reason for those who do not plan to adopt no-till.

The study found that basic attitudes about conservation do not differ significantly between farmers who use no-till and farmers who don't. Both groups are knowledgeable about the need for conservation and the kinds of practices that are appropriate to prevent soil erosion. Both have had frequent opportunities to obtain information about no-till and to see it being used on nearby farms. Users, however, perceive the indirect impacts of erosion such as downstream siltation and siltation of roadside ditches, as well as long-run production and profit decreases, as more serious problems than do nonusers.

A significant relationship was found between the yields of no-till farmers and the number of years they have been using the practice. Those who have practiced no-till the longest reported higher yields.

Interestingly, almost 70 percent of the users feel their no-till experience has been "very successful" even though their yields have been the same or less than with conventional tillage. This led the researchers to conclude that the economic optimism of the users is based on more factors than just yields. "Farmers appear to be willing to accept lower yields," the researchers wrote, "during the trial period of a new practice."

Early users, the researchers found, are much more likely to have obtained information about no-till from sources outside the Palouse area—either by traveling to see a demonstration or by making long-distance telephone calls. Their most influential sources of information are—in descending order—the Soil Conservation Service, other farmers in the area, farm magazines, chemical dealers, conferences or seminars, and tours of no-till fields.

Nonusers are influenced most by other farmers. They are more likely to be influenced positively about no-till by farm product shows, the local office of the Cooperative Extension Service, and the local land grant university.

Consistent with the findings of earlier research, the study found that users of no-till in the Palouse tend to have higher education levels, higher gross farm incomes, and larger farms than nonusers. The users also farm more rented land and are more likely to be members of a family farm corporation.

The study was funded by the Soil and Water Resources Conservation Act of 1977 (RCA). The principal investigators were Professors Don Dillman of Washington State University and John Carlson of the University of Idaho.

Barbara Osgood,
national sociologist, SCS, Washington, DC

Maine Farmers Respond to No-Till Challenge

"Challenged" by the State legislature, farmers in Franklin County, Maine, are increasing their use of no-till farming.

Franklin County was one of the first counties to participate in Maine's new Challenge Grant Program. This program, enacted by the legislature in 1983, provides funds for innovative conservation practices by soil and water conservation districts. In Franklin County, it provided funds for a cooperative project to increase the use of no-till.

Before the project, less than 2 percent of the corn acreage in Franklin County was in no-till. In 1984, the first crop year in the project, 15 farmers adopted no-till and tripled the acreage in no-till.

Funding for the project came as a challenge grant of $5,755 to the Franklin County Soil and Water Conservation District. The district then persuaded a local implement dealer to purchase a no-till planter and lease it to the district for use by participating farmers. Lack of a commercially available no-till planter had been a major obstacle to the adoption of no-till in the county. The district also hired a tractor and operator to ensure that the no-till planting was accurate and consistent.

Each no-till plot was compared with adjacent conventionally tilled fields, and the participating farmers responded to questionnaires about their experiences with the practice. The farmers and district personnel were also able to exchange information on progress of the project at an off-season dinner meeting. This information is used to help other farmers in the county to make decisions about no-till.

The following year, 1985, funds were received to study the effects of insecticides on no-till. This study involved comparison plots in the fields of six farmers.

"The no-till system is important to this part of Maine agriculture because it reduces the amount of erosion taking place on river bottom land subjected to heavy spring flooding," said L. H. York, a dairy and crop farmer and immediate past president of the Maine Association of Conservation Districts. A no-till demonstration plot on York's farm is well marked for motorists traveling along U.S. 2, a major east-west highway across northern New England.

"One of the most important aspects of the project," York said, "was that it showed the conservation district could bring together many resources and channel them into a project that applies sound conservation to the land."

The project was a cooperative effort by the farmers, the conservation district, and State and Federal agencies. The district formulated the original proposal for the project, enlisted farmers to take part, and coordinated input from State and Federal agencies. Maine's Soil and Water Conservation Commission, which administers the Challenge Grant Program, approved the project and awarded the grant. The Soil Conservation Service assisted farmers in selecting fields and monitoring the planting operations. The Agricultural Stabilization and Conservation Service provided cost-sharing funds for insecticides and herbicides, which were applied according to recommendations of the Cooperative Extension Service.

Robert A. Halbohm,
district conservationist, SCS, Farmington, Maine

Farmer Is Key to No-Till Success

A Montana farmer says success with reduced tillage and no-till depends on the farmer—not the farm.

Les Auer has about 4,800 acres of nonirrigated cropland near Broadview. He grows wheat, barley, and oats.

When Auer first experimented with reduced tillage on 100 acres of his farm a few years ago, he obtained 6 bushels per acre more on those acres than on the rest of his farm, which was under conventional tillage. The next year Auer put about half of his farm in reduced tillage. This time he got 5 bushels per acre more than from his conventionally tilled crops.

In 1985, Auer no-till seeded more than 200 acres and used reduced tillage on the rest of his farm. And because of low moisture conditions over the past 2 years, he's considering putting his entire operation into no-till for 1986, several years ahead of his own schedule.

Reduced tillage has worked well for Auer. His records show a net savings, or increase in profits, of $25 per acre by switching from conventional to reduced tillage. The savings include a decrease in hours on his tractor from 800 per year for conventional tillage to 280 per year for reduced tillage. This not only saves fuel but also reduces maintenance costs and extends the life of equipment.

His reduced tillage system includes one chemical treatment and one tillage operation. He applies chemicals in early spring to control cheatgrass, goatgrass, and bindweed. His one tillage operation with sweeps and rod weeder is performed when soil conditions are right. This operation is primarily to prepare a seedbed but also cleans up the weeds that come after the chemical application.

With no-till, Auer sprays so that the weeds are hit when they are headed out but before they set seed. With reduced till, he sprays earlier—but at lower rates—to hit the weeds when they are no taller than the length of his index finger. The weeds are easy to control then.

Before his experience of the past few years, Auer used to say no-till would never work on his clayey soils. Now he is convinced that no-till will cut his expenses even more and maybe even increase his yields in some years. He readily admits, however, that both reduced till and no-till require more management. Timing chemical applications, for example, is essential.

Although any mistakes would cut into the $25 per acre savings, the economics still dictate a change toward tilling the ground less. Auer sums it up as trying to "save moisture and convert it into bushels while cutting expenses."

Farmers who are considering reduced till or no-till, according to Auer, should get reliable information from neighbors, USDA's Soil Conservation Service and Extension Service, and various publications. Auer himself has entered into a long-term agreement with USDA's Agricultural Stabilization and Conservation Service, under which he receives some cost-sharing assistance for trying no-till.

Auer, who is a member of the board of directors of the Montana Grain Growers Association, encourages farmers to experiment—on a small scale—to see what works best for them. He is planning several comparison plots to test the effect of no-till's cooler and moister soil conditions on early seedling emergence and vigor in spring.

"It's not that no-till won't work on some farms," says Auer. "It might not work for some farmers. You have to try it to find out."

Larry Robertson,
soil conservationist, SCS, Billings, Mont.

Rain Simulator Built for Display

Rain simulators are usually built for research purposes, but they can be equally effective for demonstrating soil erosion to the public. That's proving to be the case in Iowa, where USDA's Agricultural Research Service (ARS) has built a rain simulator specifically for public display.

ARS built the new simulator after the Iowa Department of Soil Conservation and the Soil Conservation Service requested one for the 1985 Iowa State Fair. "We had a small simulator that had been used a few times for demonstration purposes," said John Laflen, an agricultural engineer with ARS in Ames, Iowa, "but it was designed for outdoor use and wasn't suited for use indoors—so we decided to build one."

Laflen turned the design and construction over to three undergraduates who are research assistants with ARS. The students—Brian Kruse, Jeff Coon, and Art Kalmes—are agricultural engineering majors at Iowa State University. They began in mid-June to design the simulator and had it ready to use by early August.

"I'd estimate we had 500 hours in designing and building it," Kruse said. "We had to build, test, and rebuild. Of course, now that design and testing are complete, the whole display could be built in about 40 hours. The toughest part was to get even rain distribution and still keep the rain from splattering on the floor at an inside event."

Like most simulators, this one duplicates the effect of rainfall by spraying water droplets the size and speed of falling raindrops onto small plots of soil. The intensity of the "rainfall" can be adjusted from 0 to 12 inches per hour.

"We have side-by-side plots of bare soil, soil with cornstalks, and soil with grass cover. There are noticeable differences in the splash effect and amount of soil running off the three," Kalmes said.

After helping to demonstrate the simulator at the 10-day fair, Kalmes is convinced the display is an effective means of demonstrating the erosive action of rainfall. He said fairgoers were attracted to the simulator by the spraying water that regularly sweeps across the plots.

"Most parents explained what was happening to their children, and they did a good job of it. It seems that most people understand soil erosion, and they've heard we're losing topsoil. But they don't often get to see the erosion process and see the difference in erosion from bare soil compared to soil protected with grass or cornstalks. Having it all in a compact unit helps bring home just how important ground cover is for soil conservation," Kalmes said.

For easy viewing, the display catches in quart jars the different amounts of soil eroded from each plot. A clear plastic panel in front of the plots shows that much more soil splashes from the bare soil than from the other plots.

The simulator works best if it's hooked up to running water, but water can also be pumped from a pond or lake. Most of the water is recirculated within the simulator.

"We use a hose to bring water to a small reservoir, and pump it from there through two sprayer nozzles about 9 feet above the ground. The water comes out of the rotating nozzles and sweeps across the plots below," Kruse said.

The simulator uses two electrical sump pumps—one to pump water from the reservoir to the spraying nozzles above the plots and one to pump excess water out of a catch tank below. An electronic timer that controls the frequency of sweeps is used to set the "rainfall" intensity. One sweep of "rain" across the plots every 5 seconds is equivalent to 3 inches of rainfall an hour.

The water tank was made from sheet metal, and the frame was made of aluminum conduit. With new pumps, timer, and paint, the cost of materials was about $1,800.

"We're extremely pleased with the display and anticipate heavy demand for it by soil conservation districts," said SCS State Conservationist Mike Nethery. "It is an excellent display for county fairs and conservation tillage meetings."

The simulator is 6 feet across, 4 feet deep, and 9 feet high. It breaks down to fit into a pickup truck and can be set up in about 45 minutes. Detailed information, including close-up slides, is available from John Laflen, Agricultural Research Service, Davidson Hall, Iowa State University, Ames, Iowa 50011.

Lynn Betts,
public affairs specialist, SCS, Des Moines, Iowa

Conservation Assistance for Three Typical Farms

As part of recent staff analysis, an economist with the U.S. Department of Agriculture's (USDA) Economic Research Service estimated the value of Government conservation assistance programs for a typical Kansas wheat farm, Wisconsin dairy farm, and Iowa corn-hog farm.

The typical Kansas wheat farm directly or indirectly benefits by $545 per year from USDA conservation programs, divided fairly equally among cost-sharing programs like the Agricultural Conservation Program (ACP), technical assistance provided by the Soil Conservation Service, and flood protection and small watershed projects. Such a farm would also receive about $150 annually in State and local public conservation expenditures.

The typical Wisconsin dairy farm benefits by $250 per year from USDA conservation programs, divided among ACP (50 percent), technical assistance (35 percent), and flood protection and small watershed projects (15 percent). State and local government conservation programs add $115 per year.

The typical Iowa corn-hog farm benefits by $210 per year from USDA conservation programs, divided among ACP (45 percent), technical assistance (35 percent), and flood protection and small watershed projects (20 percent). State and local government conservation programs add $130 per year.

Reprinted from the January/February 1986 issue of the Economic Research Service newsletter.

District Provides No-Till Equipment and Rebates

Money isn't everything. By offering rebates to farmers for trying no-till, a conservation district in eastern Pennsylvania has found that equipment availability can be as important as financial incentives in the adoption of no-till farming.

Concerned about soil erosion on farmland, the Monroe County Conservation District established a rebate program in the spring of 1983 to encourage local farmers to apply no-till. The district set aside $1,500 to help defray costs for farmers applying no-till for the first time. These funds were offered in the form of rebates of $6 an acre.

Farmers in the county can contract for no-till planting for about $10 an acre. Four no-till corn planters were available during 1983, but there were no small-grain/hay drills in the county. As a result, all of the new no-till acreage was in corn. The district paid out more than $400 in rebates.

In an evaluation of the program's first year, the Monroe County Development Committee, a group of representatives from different sectors of the county and from agricultural agencies, concluded that the limiting factor for taking advantage of the program appeared to be equipment availability. "The bottom line for increasing no-till," the committee wrote, "is to have equipment available for use."

More equipment was on the way. A survey of local farmers during the winter of 1984 indicated that several more no-till corn planters—but still no small-grain/hay planter—would be available for spring use. The district then decided that some of its 1984 funds for the rebate program should be used to obtain a no-till small-grain/hay seeder. It also entered into an agreement with the Soil Conservation Service to share the services and salary costs of a technician to help promote no-till and install other practices.

The rebates were taken off corn but continued for small grain and hay. "Farmers have been using no-till on corn for 15 years or more, but we wanted to see no-till expanded to other crops," said E. Elmer Kreger, district chairman.

By late spring of 1984, the district had leased a small-grain/hay seeder. It charged farmers $10 an acre for seeding but returned $6 an acre to them if they qualified for the rebate program.

"We planted 35 acres of oats on four farms and 49 acres of hay on six farms," said Al Weichman, district manager. "This is a good record for the year considering a late start in the season."

The district eventually purchased the small-grain/hay seeder, and the practice of no-till continues to increase in the county. During 1985, farmers were paid rebates for planting 250 acres of no-till oats, soybeans, rye, buckwheat, and sorghum. For the 1986 season, the district plans to hire a full-time technician.

To qualify for the rebates, a farmer must agree to become a district cooperator, implement a conservation plan, apply lime and fertilizer according to a soil test, and have herbicides and pesticides applied by a certified applicator. Application forms are available at the district office and local offices of SCS, Cooperative Extension Service, and Agricultural Stabilization and Conservation Service.

Fred Suffian,
district conservationist, SCS, Sciota, Pa.

Wetland Symposium To Be Held

An International Symposium on Ecology and Management of Wetlands will be held June 16-20 in Charleston, S.C. The symposium is being sponsored by several Federal and State agencies, private industry, and professional organizations.

The symposium will explore the ecology and management of wetlands of the world: their inhabitants, their uses, their similarities, and their differences. Objectives include:

- To bring together leading international scientists to define the state-of-the-art on specific topics concerning the ecology and management of wetlands;
- To discuss recent research findings and future research needs; and
- To expose graduate students and young researchers to new techniques, established scientists, and a holistic outlook on wetland problems and opportunities.

The program will consist of invited papers, contributed poster sessions, panel discussions, exhibits, field trips, and pre- and post-symposium tours.

For more information, contact Donal D. Hook, Chairman, c/o Department of Forestry, Southeastern Forest Experiment Station, 2730 Savannah Highway, Charleston, S.C. 29407.

State Floodplain Managers To Hold Conference

A conference on flood management, Backwaters '86: Strengthening Local Flood Protection Programs, will be held June 17-19, 1986, in Pittsburgh, Pa.

Presentations will be made by principal U.S. and Canadian agencies involved in flood management, including Environment Canada, U.S. Army Corps of Engineers, USDA's Soil Conservation Service, Federal Emergency Management Agency, National Weather Service, and U.S. Geological Survey.

City managers and mayors will discuss the pros and cons of present management programs. Seven special courses, intended to bring flood managers up to date on selected topics, will be offered each of the first two afternoons.

The conference will include a field trip to the sites of the Johnstown, Pa., floods, a large vendor and nonprofit organization display area, and a publications exhibit.

For more information, contact Allan N. Williams, Association of State Floodplain Managers Program Chairman, DEP/Natural Resources Center, 165 Capitol Avenue, Room 553, Hartford, Conn. 06106.

Conservation Highlights

Summary of Activities of the Soil Conservation Service for Fiscal Year 1985

In 1985, the U.S. Department of Agriculture's (USDA) Soil Conservation Service continued to concentrate on reducing excessive soil erosion on crop, range, pasture, and forest lands; conserving water used in agriculture; and reducing upstream flood damages.

Working through the Nation's nearly 3,000 soil conservation districts, SCS provided technical assistance to farmers and ranchers in applying conservation practices and systems that reduced soil losses in 1985 by 230.5 million tons. SCS also helped farmers to conserve 960,000 acre-feet of irrigation water.

In 1985, SCS completed work on 18 watershed projects—all with flood prevention as their main purpose. The completed projects are reducing flood hazards on 847,000 acres.

SCS helped landowners and land users achieve these savings in soil and water and protection from floods through close cooperation with other USDA, Federal, State, and local agencies.

Conservation Tillage

Farmers' use of all forms of conservation tillage continued to grow in 1985. According to the National Association of Conservation Districts' Conservation Tillage Information Center, of the 316.9 million acres planted to crops in 1985, farmers used some form of conservation tillage on 99.6 million acres, nearly a third. Conservation tillage is any tillage or planting system that retains at least 30-percent residue cover on the soil surface. More than 60 percent of the acres under conservation tillage are in the Corn Belt and Northern Plains States. Farmers are making the most increases in their use of conservation tillage methods on full-season corn and soybeans. Farmers used no-till, a conservation tillage method in which only a narrow seedbed is disturbed for planting, on 14.9 million acres.

Targeting

SCS, the Agricultural Stabilization and Conservation Service (ASCS), and other USDA agencies continued to target funds and technical assistance to the most serious natural resource problems in parts of 44 States and Puerto Rico. Erosion reductions on 5.8 million treated acres averaged 7.4 tons per acre. Irrigation water conserved totaled 150,000 acre-feet on 289,000 acres treated in targeted areas.

Agricultural Conservation Program

Through the Agricultural Conservation Program (ACP), SCS provided technical assistance to about 100,000 farmers and ranchers who installed conservation practices on their land. Under long-term agreements, SCS assisted 9,000 farmers, including low-income farmers, who installed enduring conservation practices such as terraces and grassed waterways. Through ACP, farmers and ranchers installed water conservation practices benefiting 598,000 acres, installed terrace systems benefiting 390,000 acres, and applied conservation tillage benefiting 1.9 million acres. ASCS administers ACP and provides financial assistance to landowners.

Great Plains Conservation Program

In the 10 Great Plains States, 943 farmers and ranchers signed long-term contracts to apply conservation measures on 2.1 million acres. Farmers completed 1,082 contracts on 2.8 million acres. Through GPCP, SCS provides technical assistance and cost sharing to landowners to minimize the hazards of recurring drought and wind and water erosion.

Rural Abandoned Mine Program

SCS administers the Rural Abandoned Mine Program (RAMP), authorized by Section 406 of the Surface Mining Control and Reclamation Act. Through RAMP, SCS provides technical and financial assistance to land users in reclaiming soil and water resources on rural lands adversely affected by past coal mining. By the close of fiscal year 1985, 498 contracts obligating $50.4 million had been signed. Conservation work done under these contracts reduced soil erosion by 532,725 tons, eliminated 820 safety and health hazards, and improved water quality in 54,587 acres of lakes and 243 miles of streams.

Soil Erosion Research

SCS continued to support research on how specific properties of eroding soils relate to losses in crop yields in all parts of the country. SCS cooperated with the Agricultural Research Service (ARS) on replacing the Universal Soil Loss Equation and Wind Erosion Equation with more up-to-date models which will be useful on a landscape and watershed scale. SCS also cooperated with ARS in evaluating soil losses from ephemeral gullies. SCS, ARS, and State universities cooperated on special soil erosion research projects in Idaho, Iowa, New Mexico, New York, North Carolina, and the Palouse area in the Northwest. Resources for the Future, a private, nonprofit conservation organization, was awarded a contract by SCS to evaluate the offsite effects of soil erosion.

Soil Moisture and Temperature Monitoring

This was the sixth year in an 8-year study that SCS monitored eight soil moisture measurement sites in the United States. Monitoring was scaled down to take readings only on the grassed sites assuming that cropped sites could be estimated from this information and the use of models. ARS is using the data to calibrate a soil moisture model which will be useful in irrigation scheduling, dryland farming, soil classification, and crop forecasting. SCS completed testing of the prototype mobile nuclear magnetic resonance soil moisture instrument.

Soil Surveys

In fiscal year 1985, 74 soil surveys were published and 75 survey manuscripts with maps were sent to be printed. SCS mapped more than 40.2 million acres during the year. An additional 5.4 million acres were mapped by cooperating agencies. Each soil survey describes the physical and chemical characteristics of the soils in the survey area—generally a county. It names and classifies the soils according to a nationwide system and provides information on the potentials and limitations of the soils for various uses. Detailed maps show where each soil is located.

Colorado River Salinity Control Program

In the Arizona Wellton–Mohawk salinity control project, SCS has assisted irrigators to develop 376 salinity control-water management plans for treating 48,588 acres. Average onfarm irrigation efficiencies have been raised from 55 percent to 80 percent, substantially reducing saline return flows to the Colorado River. The U.S. Department of the Interior's Bureau of Reclamation provides financial assistance.

Projects in the Uinta Basin, Utah, and Grand Valley, Colo., have reduced the total annual salt load to the Colorado River by about 50,700 tons. SCS provides technical assistance on these projects and USDA's Agricultural Stabilization and Conservation Service provides cost-sharing funds. Also cooperating are the Extension Service, ARS, and the Bureau of Reclamation.

In 1984, Congress enacted Public Law 98–569 to amend the Colorado River Basin Salinity Control Act of 1974 and authorize the Secretary of Agriculture to operate a voluntary onfarm salinity control program for the Colorado River Basin. The delegation of authority for administering the new program has been developed and draft rules and regulations formulated.

Small Watershed Projects

SCS began construction on 14 new Public Law 83–566 small watershed projects in 1985, approved planning for 43 projects, authorized installation of 34 projects, and completed construction on or closed out 18 projects. Small watershed projects combine conservation measures and structural and nonstructural measures to reduce flood damage and provide agricultural water management, municipal and industrial water, recreation, and wildlife habitat.

Emergency Assistance

Under Section 403 of the Agricultural Credit Act of 1978, SCS funded approximately $16.1 million worth of emergency watershed protection work during the year to help States repair damage caused by floods and other natural disasters.

Emergency Jobs Act

Funds made available under the 1983 Emergency Jobs Act (Public Law 98–8) enabled SCS to fund additional watershed, flood prevention, emergency watershed protection, and resource conservation and development measures. SCS obligated $11 million in fiscal year 1985, completing work authorized in high unemployment areas in 41 States.

Resource Conservation and Development Areas

In fiscal year 1985, work continued in the 194 areas authorized for assistance under the Resource Conservation and Development (RC&D) program. SCS provides USDA leadership for these locally initiated, sponsored, and directed areas designed to conserve natural resources, accelerate economic development, and reduce unemployment where needed to stimulate the local economy. RC&D measures completed in 1985 numbered 1,103. RC&D financial assistance was provided on 187 of these measures.

River Basin Studies

SCS leads USDA cooperation with other Federal, State, and local agencies in making investigations and surveys of river basins to guide the development of water and related land resources in agricultural, rural, and upstream watersheds. In 1985, 69 river basin studies were in progress in 47 States and 12 were completed.

Flood Plain Management

Under Section 6 of Public Law 83–566, SCS completed 34 flood plain management studies and 7 reimbursable flood insurance studies in 1985. The studies include data on natural and beneficial values of flood plains and on management alternatives. Local units of government use this information to develop, adopt, implement, and amend flood plain management programs.

Resource Inventories

The fieldwork for the 1982 National Resources Inventory (NRI) was completed in 1982, and the final NRI data were released in 1984. In 1985, SCS worked on a statistical bulletin summarizing the 1982 NRI data, which include information on soil, water, vegetation, and related resources.

Important Farmland Inventory

As authorized by Section 302 of the Rural Development Act of 1972, SCS leads USDA efforts for inventorying the Nation's important agricultural areas. By the end of fiscal year 1985, SCS had published important farmland maps—which delineate prime, unique, and other important farmlands—for about 930 counties. Another 350 maps are nearly completed. Statewide prime farmland maps have been completed for 18 States.

Cartography and Geographic Information Systems

The SCS National Cartographic Center reproduced 50,000 conservation plan maps for land users and 1,300 base and thematic maps. The center contracted for the photographic reproduction of 45,500 maps and printing of maps for 100 new soil surveys. The center also provided States with new maps for 123 soil survey areas. Significant mapping support was provided in developing a series of drainage area maps for the Great Lakes and Chesapeake Bay. The cartographic center also assisted with developing a general soil map for the Kingdom of Saudi Arabia.

Rural Development

Through State and local Food and Agriculture Councils, SCS cooperated with many others to improve program delivery in rural development. In fiscal year 1985, SCS assisted more than 29,000 units of government in rural communities to control flooding, reduce roadside erosion, improve the landscape, and preserve historical and cultural resources. Many private citizens volunteered their time and talents to these activities to gain for their communities rural, municipal, and industrial water supplies; irrigation water; and recreation areas.

Volunteers

Close to 600 volunteers, of all ages, donated 50,000 hours in 1985 to help SCS with soil and water conservation. Their time, most of it spent in field tasks, is valued at almost half a million dollars. SCS is seeking more volunteers.

Engineering

In 1985, SCS worked on developing technical guides to help farmers improve the water conservation benefits of surge irrigation. The data base for the national inventory of SCS-assisted dams became fully operational. A team of SCS and ARS employees developed an interactive computer program of SCS Technical Release 55, "Urban Hydrology for Watersheds." The program can be used in determining the effects of conservation practices on flood reduction in rural and urban areas. SCS developed three training modules for field staffs on the Unified, American Association of State Highway and Transportation Officials, and USDA textural soil classification systems. SCS revised its National Engineering Handbook, Section 19, to include the latest procedures for inspecting and testing construction materials. SCS also issued revised Technical Release 60, "Earth Dams and Reservoirs," to reflect changes in hydrology, peak breach discharge, and slope stability criteria.

Water Quality

SCS continued efforts to integrate the improvement of water quality into its programs. Activities included cosponsoring the National Nonpoint Source Conference in Kansas City, Mo., and the North American Lake Management International Meeting at Lake Geneva, Wis.; serving on the nonpoint source subcommittee of the International Joint Commission's Water Quality Board; assisting States in the development of the U.S. task force phosphorus reduction plans for Lakes Erie and Ontario; and assigning a full-time liaison to the U.S. Department of the Interior's Bureau of Reclamation office in Denver, Colo., to coordinate salinity control for the Colorado River.

In responding to the Chesapeake Bay clean-up effort, SCS provided $30 million in assistance to Maryland, Pennsylvania and Virginia. In addition to the direct assistance for new State nonpoint source programs, SCS has developed a training program for conservation district supervisors and has trained SCS and State personnel on water quality issues. SCS cosponsored a special issue of the Soil Conservation Society of America's journal on nonpoint source pollution and jointly funded development of a documentary on nonpoint source pollution through the Nebraska public television system.

Rural Clean Water Program

The Rural Clean Water Program (RCWP) was created by Public Law 96–108 in 1980 as an experiment to evaluate the effectiveness of conservation practices in solving nonpoint source water quality problems. To date 1,838 individuals have signed contracts totaling $28 million in the 20 RCWP projects. When completed, the conservation practices in these contracts will adequately treat 337,033 acres. The signed contracts have used 81 percent of the available RCWP cost-share assistance for treatment on 63 percent of estimated critical areas.

Conservation Education

SCS and the General Federation of Women's Clubs are cooperating on a multiyear program, "The World at Your Feet." Since 1984, thousands of club women have been involved in local soil and water conservation activities. SCS assisted the National Wildlife Federation through its National Wildlife Week to reach more than 100 million people over 2 years with the message "Soil—We Can't Grow Without It."

Snow Surveys

Through its Snow Telemetry System (SNOTEL), SCS collected snowpack information at more than 500 automatic data collection sites in the Western United States. SCS also issued more than 3,500 water supply forecasts used by municipal water authorities, irrigation companies, and individuals. With funds from the National Weather Service, the SNOTEL system in the Colorado River Basin is being expanded by 37 sites to enable forecasters to predict runoff more accurately.

Range

SCS continued to promote the proper management of rangeland vegetation to protect soil and water resources while improving the efficiency of lifestock production. With a number of other organizations, SCS cosponsored the National Conference on Range in November 1985. The conference drew 600 participants to explore opportunities for conserving and improving range. A new training agreement enables SCS to assign certain employees to work on a conservation district cooperator's farm or ranch to gain hands-on experience in farm or ranch operations.

Windbreaks

SCS assisted with planting an estimated 2,000 miles of field windbreaks in 1985 to protect cropland from wind erosion and provide wildlife habitat. The agency also assisted landowners with planting farmstead and feedlot windbreaks to save energy.

Fish and Wildlife

SCS continued to provide technical assistance to land users to maintain and improve wildlife and fish habitat on private land. This assistance led to improved management of 1.8 million acres of upland habitat and 300,000 acres of wetland habitat, benefiting a wide variety of wildlife species.

Plant Materials

SCS plant materials centers cooperatively released seven conservation plants in 1985. These plants are intended for a variety of conservation uses ranging from controlling critical soil erosion in orchards in Hawaii to providing improved protection and forage quality on rangeland in the Southwest. Commercial production available for use in 1985 of all SCS conservation releases totaled 5.5 million pounds of seed and 11.4 million plants, enough to treat 1.2 million acres of land. This was worth $19.4 million on the retail market.

Cultural Resources Activities

Among the significant cultural resources discovered and protected during SCS activities this year are a 12th century Mississippian Indian mound complex in Tennessee and an early farm site in Hawaii. While the level of protection for cultural resources has increased, SCS expenditures for contracted cultural resources studies have decreased by 84 percent over the last 5 years. The savings can be attributed to more and better training of field personnel, streamlined procedures, and critical evaluations of contractors' reports and recommendations.

Sociology

A study of early adopters of no-till in the Palouse area of Washington and Idaho was completed by researchers at the University of Idaho and Washington State University. An SCS National Headquarters team was established to improve the distribution of sociological information on the adoption of conservation practices to SCS personnel in the field. SCS completed two training modules for field employees: "Applying Social Data to Conservation Planning and Application," and "Collecting and Analyzing Social Information." In 1985, SCS cosponsored a symposium entitled: "Implications of Social and Economic Research for Policy Development and Program Implementation." An executive summary has been published by the Soil Conservation Society of America.

Information Resources Management

SCS and Farmers Home Administration (FmHA) developed a joint procurement contract for purchasing microcomputer office automation equipment. The contract was awarded in September 1985 and will cover several years. The company chosen will provide computer services—both hardware and software—to 3,300 SCS offices and 2,500 FmHA offices. Field Office Communications and Automation System (FOCAS) equipment will enable SCS to improve lines of communication with other Federal, State, and local governments and improve service to land users.

Reform '88

SCS Reform '88 initiatives have led to improved quality and timeliness in performing administrative functions and implementing conservation programs. The quality of the services SCS delivers will continue to increase with the growth of FOCAS, cooperative processing, automated systems, and paperwork reduction.

International Activities

SCS shares its technical expertise in soil and water conservation, natural resource surveys, and rural community protection and development with other countries. In fiscal year 1985, 165 specialists traveled to 42 countries to provide technical assistance requested by the Agency for International Development (AID), international organizations, and individual nations. Participation included representation at soil and water resource related international forums in addition to long- and short-term technical assistance activities. Short-term assignments included scientific and technical exchanges as well as assignments under the Soil Management Support Services, an AID project implemented by SCS to provide technical assistance in soil survey, soil classification, and use and management of soils to developing countries. Also, 253 officials, scientists, and technicians from 49 countries observed conservation practices in the United States.

Resources Conservation Act Appraisal

The second appraisal of the soil, water, and related resources of the Nation required by the Soil and Water Resources Conservation Act of 1977 is underway. It is focusing on a comparison of the 1977 and 1982 National Resources Inventory, the highest soil and water conservation priorities in the National Conservation Program, and resource concerns identified by the public and interest groups. The appraisal is scheduled for completion in March 1987.

Economics

To improve SCS technical assistance to landowners and users, more than 175 SCS field employees received training in the use of economic principles and methodologies in conservation planning. A microcomputer program was developed for field staffs to use in evaluating the benefits and costs of alternative conservation practices for controlling sheet and rill erosion.

Summary of Accomplishments Fiscal Year 1985

Accomplishments in soil and water conservation programs assisted by the Soil Conservation Service.

Progress Item		Fiscal Year 1985
Long-term Contracts		
Contracts completed or terminated		
GPCP	No.	1,179
	acres	3,054,899
RAMP	No.	14
	acres	191
Watershed protection and flood prevention	No.	125
	acres	18,050
Contracts signed		
GPCP	No.	943
	acres	2,144,880
RAMP	No.	76
	acres	822
Watershed protection and flood prevention	No.	737
	acres	97,180
Unserviced applications		
GPCP	No.	1,521
RAMP	No.	1,325
Watershed protection and flood prevention	No.	1,119
	acres	218,151
Resource Conservation and Development Areas		
RC&D measures completed	No.	1,103
Conservation Plans and Related Services		
New district cooperators	No.	2,913
	acres	7,599,026
Individuals, groups, and units of government assisted	No.	942,681
Individuals and groups applying practices	No.	411,830
Conservation plans	acres	10,605,343
Soil Surveys		
Soil surveys	acres	45,556,087

CONSERVATION Research Roundup

Scientists Measure Iron Oxide to Estimate Soil Age

Hoping to determine the rate of soil formation compared to erosion, scientists at the University of California, Davis, are comparing iron oxide content in soils of various ages.

Graduate student Jacob R. Aniku and Professor Michael J. Singer, both of the department of land, air, and water resources, have been studying methods for determining soil age using characteristics which can be observed and quantified.

Iron oxide is one such characteristic which can be monitored and may be useful to detect soil age. As soils age and the parent material weathers, iron oxides gradually build up. If scientists find the amount of iron oxide in soils of known age, they can then compare the amount of iron oxide in soils of unknown age and estimate how old they are.

Aniku and Singer applied this technique to four marine terrace soils on the Pacific Coast near Santa Cruz, Calif. The ages of these soils are known.

By monitoring the accumulation of iron oxides in the soil and by noting other changes in soil properties, researchers can estimate the relative age of sediments. These techniques help scientists determine how fast soil is forming, and in turn, whether it is in danger of eroding faster than it forms. This method is important to basic soils studies and may provide information to explain soil properties of significance to agriculture or environmental pollution.

Tillage Practice Affects Nitrogen Loss in Soil

Farmers who switch to conservation tillage may affect soil fertility and nitrogen loss in the process, says Gary Malzer, soil scientist with the University of Minnesota's Agricultural Experiment Station.

According to Malzer, the recent shift by farmers to conservation tillage in order to reduce energy, labor, and machinery costs as well as soil erosion is causing a reexamination of nitrogen management. He says the amount of surface residue affects the fertility, water, temperature, aeration, and biological activity of the soil. In the case of conservation tillage, increased crop residue acts like a mulch, keeping soil wetter, colder, and, as a consequence, less biologically active.

To learn more about the relationship between tillage practice and soil fertility, Malzer examined the rate of nitrogen transformation (nitrogen transforms naturally from ammonium to nitrate, a form more readily lost from soil) on continuous corn grown under four tillage practices—moldboard plow, chisel plow, ridge-till, and no-till. He conducted the tests on a Hubbard loamy sand and on a Mt. Carrol silt loam. Anhydrous ammonia was applied to the test plots, both with and without nitrapyrin, a chemical that inhibits the microbes that transform ammonium to nitrate.

Under all tillage treatments with both soil types, nitrapyrin reduced the rate of nitrogen transformation. Under the moldboard plow treatment without nitrapyrin, 84 percent of the ammonium within the area sampled was transformed by the sixth week; with nitrapyrin, only 45 percent of the ammonium was transformed.

Malzer also found dramatic yield increases, as much as 50 bushels per acre, when nitrapyrin was applied at the loamy sand site on no-till and moldboard plow treatments. Smaller yield increases, about 20 bushels per acre, were observed on the ridge-till and chisel-plow systems. There was little affect on yield when nitrapyrin was applied on the silt loam site.

Malzer says this research could eventually lead to different fertilizer recommendations for different tillage systems.

Long-Term No-Till May Improve Soil Structure

Many farmers are cultivating their fields using tillage systems that may not be the best suited for the physical properties of the soil, according to research agronomists at Purdue University, West Lafayette, Ind.

By measuring the air flow through core samples of soil, the researchers found that long-term no-till may lead to improved soil structure and continuity of air flow through pores on poorly structured soils. Air flow rates are important in the soil because they can affect rates of root growth.

John R. Heard, former graduate student at Purdue and currently a soil and crops specialist with the Ministry of Agriculture and Food in Stratford, Ontario, Canada, conducted the research along with Eileen J. Kladivko, Purdue assistant professor of agronomy.

For the study, Heard and Kladivko took soil samples at three depths: 6, 10, and 14 inches. The samples were taken in the rows and in the nontrafficked interrows of plow, chisel, ridge till-plant, and no-till plots. The plots contained continuous soybeans or a soybean and corn rotation.

Air flow through the core samples was measured under a low constant air pressure.

The air permeability in tilled treatments of well-structured Chalmers soil was reduced "between the rows" in comparison with the rows. This result was probably due to interrow cultivation, the researchers said.

In the deeper depths of the Chalmers soil, no-till plots had better air flow than tilled plots. A higher amount of biological activity and a lack of pore destruction by tillage probably caused no-till plots to have better air flow.

In poorly structured Clermont soil with low organic matter, ridge-till had the greatest air permeability of all tillage treatments at the 6-inch depth. No-till and ridge-till had better air flow than chisel or plow from 8 to 16 inches deep.

Long-term no-till practices may lead to improved soil structure and continuity of pores on poorly structured soils.

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New Publications

Soil Erosion and Crop Productivity

Edited by R. F. Follett
and B. A. Stewart

The American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and Soil Science Society of America (SSSA) held a symposium to bring together soil scientists, economists, sociologists, historians, and other specialists to discuss their research findings on the impacts of soil erosion on crop productivity. Soil erosion caused by flooding, unrelenting rains, or high winds can devastate a farm in a short time; it can destroy a productive field in just a few generations.

The subject of soil erosion is a highly controversial one—some believing it is only a minor problem; others stating that it is a most serious worldwide concern. Some of the issues discussed are: the decreasing crop productivity on farmlands; philosophical, socioeconomic, and institutional causes of excessive erosion; the methodology of measuring the impact of soil erosion on crop productivity; current technological and institutional advances for erosion control and productivity maintenance by physiographic regions of the United States; and the strategy for influencing policy and institutional decisions regarding the impacts of soil erosion to protect the long-range interests of the public in land productivity.

Copies of this 533-page text are available for $36 from ASA, CSSA, and SSSA, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

Grass and Legume Seed Production in Montana and Wyoming

by Larry K. Holzworth
and Loren E. Wiesner

This publication provides general guidelines for seed production in Montana and Wyoming and some detailed guidelines for selected species. It contains information on selecting a site, preparing the seedbed, planting the grass or legume, controlling weeds, and irrigating and fertilizing the crop to produce certified seed. Certified seed is needed by land users who must treat conservation problems on their land.

The information in this publication should be of interest to seedgrowers in producing certified seed of conservation plants as well as to Federal, State, and other cooperating agencies.

Single copies of *Grass and Legume Seed Production in Montana and Wyoming* are available from the Extension Mailing Room, Pryor Hall, Montana State University, Bozeman, Mont. 59717.

Principles and Applications of Hydrochemistry

by Erik Eriksson

The author defines hydrochemistry as "the subject area of transformation and transportation of substances, together with the circulation of water in the continental areas of the globe, on a time scale up to a few thousand years."

After an introductory chapter comes a chapter on elementary chemical principles of particular use in hydrochemistry. Other chapters include information on the various hydrochemical processes following the flow path of water from the atmosphere to the soil surface and into the domains of soils and minerals to ground water discharge areas, where water appears on the surface in lakes and water courses; possible hydrochemical models; and environmental isotopes and their role as carriers of information on hydrological systems; and finally the applications of hydrochemistry.

Many illustrations are used throughout this 187-page text.

Copies are available for $39.95 from Methuen, Inc., 29 West 35th Street, New York, N.Y. 10001.

National Range Conference Proceedings

The U.S. Department of Agriculture along with 60 other sponsors, held a conference in November 1985 to call attention to opportunities for improving the management and productivity of rangelands. The conference brought together ranchers, research scientists, environmentalists, educators, private business people, and government officials to discuss the many environmental and economic choices facing rangeland managers today.

Some recurring messages were heard throughout the conference, such as: there must be cooperation between landowners and government officials; range managers must keep attuned to the needs and changes in the range ecosystem and adapt their management accordingly; use of rangeland will become more diversified in the future; strengthened research programs are needed; and tax policies, international trade, and other factors influence the use and condition of range.

The papers presented here are by experts in their fields.

For copies of this 158-page publication, contact Douglas Sellars, c/o National Rangeland Conference, P.O. Box 2890, Washington, DC 20013-2890.

Soil Salinity Under Irrigation: Processes and Management

Edited by I. Shainberg
and J. Shalhevet

This book was prepared as background for an international symposium held in Bet Dagan, Israel, in March 1984. It is based on the papers presented and summarizes the findings.

The subject matter of soil salinity under irrigation is divided into two broad aspects. The first, processes, covers the basic chemical reactions taking place in saline and sodic soils and their effect on soil physical properties, the dynamics of salt transport in the soil and its accumulation to detrimental levels, and the methodology of monitoring soil salinity and evaluating water quality.

For the second aspect, management, basic principles are used to describe and evaluate the technologies of leaching, drainage, and reclamation on a field scale, taking into account spatial variability.

Crop production is discussed with respect to the various management practices used in irrigation agriculture.

Many graphs and tables are used throughout to further illustrate the information in the text.

Copies of this 349-page book are available for $52 from Springer-Verlag New York, Inc., 44 Hartz Way, Secaucus, N.J. 07094-2491.

Recent Soil Surveys

Published by the Soil Conservation Service

Massachusetts: Worcester County.
Mississippi: Marion County.
Missouri: Stoddard County.
South Carolina: Oconee County.
South Dakota: Meade County.

U.S. GOVERNMENT PRINTING OFFICE: 1986—490-922 40001

7/2

May 1986 Volume 7, Number 2

Soil and Water Conservation News

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN–0199–9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013–2890.

Subscriptions
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From the SCS Chief

The Soil Conservation Service—A Tradition of Excellence

When I became Chief of the Soil Conservation Service a year ago, I was convinced that SCS was one of the best agencies in the Federal Government, and I'm even more convinced of that today!

Thanks to the dedication and professionalism of SCS employees across the country, no other agency uses its resources more wisely or for a better purpose.

Over the past year, SCS has reconfirmed its strong working relationship with conservation districts, State soil conservation agencies, and other Federal agencies. SCS technicians have worked one-on-one with hundreds of thousands of landowners in advising them on ways to protect the soil and water resources on their farms and ranches.

In 1985, working through conservation districts, SCS helped farmers and ranchers apply soil and water conservation practices and systems that reduced soil losses by more than 230 million tons and conserved almost a million acre-feet of irrigation water.

The National Range Conference that SCS cosponsored last fall helped focus attention not only on erosion and other problems on rangeland and improved pastures, but also on many opportunities for improvement and multiple use of these vast resources.

This spring, SCS sponsored a joint seminar with the predominantly black 1890 Land Grant Institutions and Tuskegee University. This is a first step in working more closely with these institutions to improve the delivery of SCS assistance to low-income, minority farmers and ranchers.

We can all be especially proud of SCS efforts in helping to design the conservation title of the 1985 Food Security Act. The conservation title of this landmark legislation promises to have far-reaching effects in the future conservation of soil and water resources. I appreciate the teamwork of SCS field staffs in helping to implement the new law.

As SCS faces tough decisions in meeting budget and other constraints, I assure you that our goal is to maintain adequate field staffs to work with farmers and ranchers through conservation districts.

Employees in SCS are an example of what's right with government. Amid the serious challenges we'll face in the months ahead, I know that all of us will continue the longstanding SCS tradition of excellence.

Wilson Scaling

Cover: Canada geese, Berkshire County, Mass. See articles about managing natural resources for wildlife beginning on page 7.

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

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NACD Holds 40th Convention

The president of the National Association of Conservation Districts (NACD), Clarence Durban, issued a challenge to some 2,000 members attending NACD's 40th annual convention, February 2–6, in Nashville, Tenn. He said that 1986 is a time to move forward with soil conservation programs rather than give in to "dooms-day" talk and anticipated budget cuts.

Durban said conservation programs stand at the crossroads: on one side are the budget cutters who will try to reduce conservation budgets, the "nay-sayers" who believe nothing can be done to prevent the cuts, and the "gloom and doom" people who believe nothing can be done to help restore the vitality of agriculture.

"On the other side, I see a team of dedicated people, hundreds of thousands strong, who are committed to protecting this thin layer of soil that provides for all we have," emphasized Durban.

The conservation leader identified the four components of the team that will lead the conservation movement in the future as the conservation district officials, Federal agencies and legislators, State agencies and legislators, and agribusiness.

"You don't get the recognition you deserve," he told convention delegates, "but you are the backbone of the soil conservation programs in this country. Your dedication has seen the soil conservation movement through some difficult times in the past 40 years. There are more ahead of us, but I know that your perseverance will see us through these difficult times as well.

"The strength of the team—district leaders, Federal workers, and State agencies and organizations—is shown in the 50-year history of conservation accomplishments, and in 1986, it is shown in the conservation title of the 1985 Farm Bill," Durban pointed out. In that bill is some of the strongest language ever adopted by Congress in dealing with soil conservation.

"Along with the breakthrough will come new responsibilities for you as district officials," he emphasized. "We have asked for the challenge of the new programs such as the conservation reserve, nonpoint source pollution control, and urban sediment control. Now it is our turn to show that the work can be accomplished and that there will be positive effect."

At the convention, Durban outlined key issues for 1986 to the NACD Board. They include implementation of the conservation reserve, ensuring that the Federal Government provides technical assistance in every conservation district, strengthening State conservation agencies, increasing the recognition of district officials, interacting with other national interest groups, and encouraging the business community to take a more active role in soil conservation issues.

Two leading Tennesseans addressed the opening general session of the convention. Congressman Ed Jones and Lieutenant Governor John Wilder both challenged the attendees to continue to let Congress and the Administration know that soil and water conservation issues will continue to be as important to farmers and other landowners in the future as in the past.

Jones told the conservation leaders that "our close relationship has been mutually beneficial, resulting last year in the enactment of major new conservation initiatives and reforms." Jones told NACD members that "your long-term presence in Washington has given great strength, great stability, and great credibility to our legislative efforts."

Following the theme "use without abuse," Lieutenant Governor Wilder said conservation district work has always stood for conservation self-development and local government. "We must continue to develop programs that permit use of the land while making it better for the future," he said.

Wilder stated that the United States should develop programs to produce and deliver quality merchandise at competitive prices, and be a consistent supplier with the help of the Federal Government.

At the convention, NACD recognized six outstanding conservationists who have made a national contribution to the conservation cause:

- Walter N. Peechatka, executive vice president of the Soil Conservation Society of America, received the Distinguished Service Award.
- Kenneth J. Roehrich, Hackettstown, N.J., received the Special Service Award.
- Merlind "Bud" Lennoye, executive vice president of the North Dakota Association of Soil Conservation Districts, received the Professional Service Award.
- Taylor Brown, farm director of the Northern Ag Network, Billings, Mont., received the Communications Award.
- Pioneer Hi-Bred International, Inc., received the Business Conservation Leadership Award.
- George B. Wolff, past president of the Pennsylvania Association of Conservation District Directors, received the Special Recognition Award.

Soil and Water Conservation Research in Progress

The Soil Conservation Service works closely with USDA's Agricultural Research Service (ARS) in determining agricultural research needs, setting priorities, running field tests, and helping landowners and land users apply the results. Following are descriptions of some soil and water conservation research projects that were underway at ARS laboratories in December 1985:

- ARS researchers at the Soil & Crop Management Research Laboratory at Bushland, Tex., developed a reduced-tillage system for growing furrow-irrigated grain sorghum in the southern High Plains that may also prove successful with irrigated corn. The system increases the space between plant rows from the usual 10 inches to 30 inches and water furrow spacing from 40 to 60 inches. Grain yields using the wide-bed reduced-tillage system were 5 percent higher than with conventional tillage, and costs were reduced $3.50 per acre. For more information contact Ronald Allen (806) 378–5738.

- Conventional furrow irrigation for dry bean production in the West often wastes water and causes severe soil erosion because fields are typically irrigated until the entire surface is wet. By irrigating only long enough for the water to reach the end of the furrow and then planting the bean seed in the bottom of the furrow a few days later, ARS researchers at the Soil Management and Water Quality Laboratory at Kimberly, Idaho, reduced the quantity of water applied for preplanting by 60 percent. Further, by limiting irrigation to the furrows where the beans were growing, total water applied was reduced 42 percent without affecting yields. For more information contact Robert Berg (208) 423–5582.
- An ARS project to test economical and reliable methods for predicting salt accumulation in soil has been funded by SCS. Field testing is being done in the San Joaquin Valley, Calif. Scientists are testing new instruments that are fast and easy to use and provide reliable data on a large scale. Salt accumulation is a potential danger on all irrigated cropland; in California alone, up to 1 million acres are starting to show damage. Soil salinity data for large areas will make it possible to map potential problem areas and reduce or prevent problems through proper management. For more information contact James Rhoades at the U.S. Salinity Laboratory at Riverside, Calif., (714) 683–0170.
- Annual soil erosion on a 6.7-acre southern Piedmont watershed with an average slope of 4 percent was reduced from 25 tons to 0.002 ton per acre over a 10-year period through a combination of conservation tillage and double cropping. Runoff was reduced from 18 percent to 0.5 percent of annual precipitation. ARS researchers at the Southern Piedmont Conservation Research Center at Watkinsville, Ga., gradually converted the watershed from soybean monocropping to wheat/soybean double cropping, balancing row crops with closely spaced small grains. They changed rotations in response to problems with weeds, soil erosion, yield decreases, and nitrogen costs. For more information contact George Langdale (404) 769–5631.
- Researchers at the Coastal Plains Soil & Water Conservation Center at Florence, S.C., found that a collapsible fabric dam that controls water levels of both a stream and its adjacent ground water table may help farmers in Mid-Atlantic States overcome seasonal droughts. Water pumped from behind a collapsible dam supplied eight center-pivots, four volume guns, and one subirrigation system. Moreover, the raised water table sustained crop growth on nonirrigated parts of a 2,000-acre study area. Raising the water table also reduced the amount of subsurface drainage, thus reducing entry of nitrates into streams by 50 percent. For more information contact Coy Doty (803) 669–5203.
- Researchers at the National Soil Erosion Research Laboratory at West Lafayette, Ind., and other locations have been working on a new method for predicting soil losses from the action of water. The method is scheduled to be released for testing in April 1989. Known as the USDA Water Erosion Prediction Project (WEPP), it will replace the Universal Soil Loss Equation, developed 25 years ago and now in wide use throughout the world. For more information contact G. R. Foster (317) 494–7748.
- In a project similar to the WEPP, ARS is involved in replacing the present Wind Erosion Equation. An ARS team of four agricultural engineers, three soil scientists, and one agronomist has been assigned to the project as well as a project coordinator. The wind erosion prediction system will be flexible in choice of area and time frame—from single to multiple fields and from single erosion events to crop-sequence periods for a number of years. For more information contact the project coordinator, George Cole at Kansas State University, Manhattan, Kans., (913) 776–2756.
- Germplasm of nitrogen-fixing legumes, some introduced from countries in Asia, Africa, and South America, is being tested at the Forage & Range Research Laboratory at Logan, Utah, in an effort to develop plants that can tolerate the semiarid conditions in the intermountain area of the western United States. Studies of the legumes thus far have helped in improving seed production and adaptation and have increased information about the problems of the millions of acres of rangeland that get less than 12 inches of precipitation annually. Currently, all legumes that are well adapted to low rainfall areas are toxic to livestock. For more information contact Melvin Rumbaugh (801) 750–3077.
- No-till systems effectively control soil erosion and runoff. The lack of annual tillage creates changes in the topsoil and subsoil that may affect the amount and quality of water moving through the soil. Researchers at the North Appalachian Experimental Watershed, Coshocton, Ohio, are conducting experiments to find out where and how fast water travels through the soil under no-till conditions. Their work has shown that large vertically continuous worm holes may be significant channels for the rapid movement of some water through a crop's root zone. For more information contact William Edwards (614) 545–6349.
- Nitrate leaching to ground water can be controlled with information from an updated and expanded computer model called Nitrogen-Tillage-Residue Management. The model predicts the best nitrogen fertilizer practices for producing high crop yields, while protecting the environment from excess nitrate leaching. The model is also a valuable research tool. Results of tests that would take several years with standard field-plot techniques can be calculated in a few weeks using the model. Research on the model was done at the Soil & Water Research Management Laboratory at St. Paul, Minn. For more information contact M. J. Shaffer (612) 376–3669.

Compiled from "Quarterly Report on Selected Research Projects of the Agricultural Research Service, October 1 to December 31, 1985."

Forum Held on the Future of Agriculture

The mega-trends in American agriculture mean it is on an irreversible course of change, but opportunities exist to make certain the agriculture of the future is more resource conserving and people supporting, said participants in a forum on the future of agriculture. The forum was sponsored by the American Land Resource Association on December 5, 1985, in Washington, DC.

"Policymakers working on the Farm Bill would benefit from an understanding of the mega-trends that are affecting agriculture today," asserted James Giltmier, assistant Washington representative for the Tennessee Valley Authority. Those include major changes in the marketing of farm products. Producers will have to become partners with food processors and produce "for markets that are really there, not those a grower hopes will be there," Giltmier said.

"We've been through the mechanization and the chemical revolution in agriculture," said Michael Phillips of the Congressional Office of Technology Assessment. "We're now entering the era of bio- and information-technology; . . . and biotechnology is one of America's major advantages in the international marketplace."

Another trend is the "bench-level" enthusiasm for nonchemical alternatives in agriculture that can keep farm costs low and make the whole farm system resource conserving, reflected Garth Youngberg, director of the Institute for Alternative Agriculture.

In the midst of these trends, opportunities exist for building an agriculture that is more resource conserving and supportive of human needs, panelists asserted. "We need to be more honest and plan for the consequences of technological changes," said Peggy Denker, deputy director of the Rural Coalition. Suggestions for positive action included:

- Developing separate Government farm programs for large, small, and subsistence growers, recognizing that each of these categories has different objectives and needs;
- Moving away from the "hard tomatoes" era by directing publicly supported biogenetic research to improve the quality and nutrition of food as well as building more resource-conserving production systems;
- Correcting tax incentives to reward resource-conserving systems instead of subsidizing debt;
- Developing transitional programs for producers who are under great stress from the pressures of the changing system;
- Strengthening regional rural agencies, which can foster natural resource-based economic development to build the farm economy and provide job opportunities to those producers who move to part-time farming;
- Building information on low-input, diversified, resource-conserving farming systems into the public agricultural information process;
- Creating a revolving fund to buy agricultural land now being put on the market, developing conservation plans for the land, and reselling it with conservation requirements included in the land deed; and
- Providing protections and economic opportunities for farmworkers as technological changes affect their livelihoods.

"It is clear the agenda in agriculture is for change," said Kevin J. Coyle, president of the American Land Resource Association, "but we have some important choices facing us in the ways we go about managing that change."

Proceedings of this Forum are available, in an edited form, in the spring 1986 issue of the *American Land Forum* magazine. Contact the American Land Resource Association, 5410 Grosvenor Lane, Bethesda, Md. 20814.

SCS Compiles Sample for Landowner Survey

District conservationists with the Soil Conservation Service helped a group of universities earlier this year to conduct a nationwide survey of landowners. The survey, the National Private Landowner Survey (NPLOS), dealt with types of land use, resource management practices, use of technical assistance, and other aspects of land management.

With the approval of the local conservation district boards, SCS district conservationists in 700 selected counties compiled a mailing list for the survey by consulting local tax rolls, which are public record. The universities then administered the survey, mailing questionnaires to more than 17,000 landowners in the 48 contiguous States.

The conservationist in each county—following procedures designed to obtain a random sample—selected about 25 landowners and listed their names and addresses. Only individuals owning 20 or more acres were to be listed. Individuals owning more than one parcel of land in the county were not to be listed more than once.

NPLOS is a joint project of nine universities: Clemson University, Clemson, S.C.; Cornell University, Ithaca, N.Y.; Duke University, Durham, N.C.; Mississippi State University, Mississippi State, Miss.; North Carolina State, Raleigh, N.C.; Oregon State University, Corvallis, Oreg.; Purdue University, Lafayette, Ind.; Stephen F. Austin State University, Nacogdoches, Tex.; and the University of Georgia, Athens, Ga.

Farmers' Use of Conservation Tillage Still Growing

In 1985, farmers planted more acres in some form of conservation tillage than ever before—a total of 99.6 million acres—reports the Conservation Tillage Information Center (CTIC) in its fourth annual national survey of conservation tillage acreage. That's an increase of 2.8 million acres over last year, and nearly a third of the 316.9 million acres planted to crops in 1985.

More than 60 percent of the acres under conservation tillage are in the Corn Belt and Northern Plains States, and farmers are making the most increases in their use of conservation tillage methods on full-season corn and soybeans.

Conservation tillage is any tillage and planting system that maintains at least 30 percent of the soil surface covered by residue after planting to reduce soil erosion by water. Where soil erosion by wind is the primary concern, conservation tillage methods maintain at least 1,000 pounds of flat small grain residue equivalent on the surface during the critical erosion period.

The CTIC in Fort Wayne, Ind., is administered by the National Association of Conservation Districts as a special project in cooperation with agricultural industry, government agencies, private foundations, organizations, and farmers.

For the fourth year, the Center has compiled the "National Survey of Conservation Tillage Practices" based on data provided by the field staff of the Soil Conservation Service in cooperation with the Cooperative Extension Service, Agricultural Stabilization and Conservation Service, soil and water conservation districts, and agri-business.

Conservation tillage data were collected on a county-by-county basis and are broken down in the survey by conservation tillage method into 12 crop categories, which include full season and double crop categories for corn, soybeans, and grain sorghum. The different types of conservation tillage included in the survey were no-till, ridge-till, strip-till, mulch-till, and reduced till.

In 1985, according to the CTIC, the acreage under ridge-till increased 45 percent with more than 75 percent of that increase occurring within the Corn Belt and Northern Plains States.

Iowa ranked first in total number of conservation tillage acres, with 12 million, a 2-million-acre increase over last year. Kansas ranked second.

Of Iowa's total conservation tillage acreage, 10.9 million acres was under mulch-till, making Iowa the leader in that category as well. Illinois ranked second in the number of mulch-till acres. Other top-ranked States are Illinois and Ohio for no-till, Nebraska and Minnesota for ridge-till, and Nebraska and Alabama for strip-till.

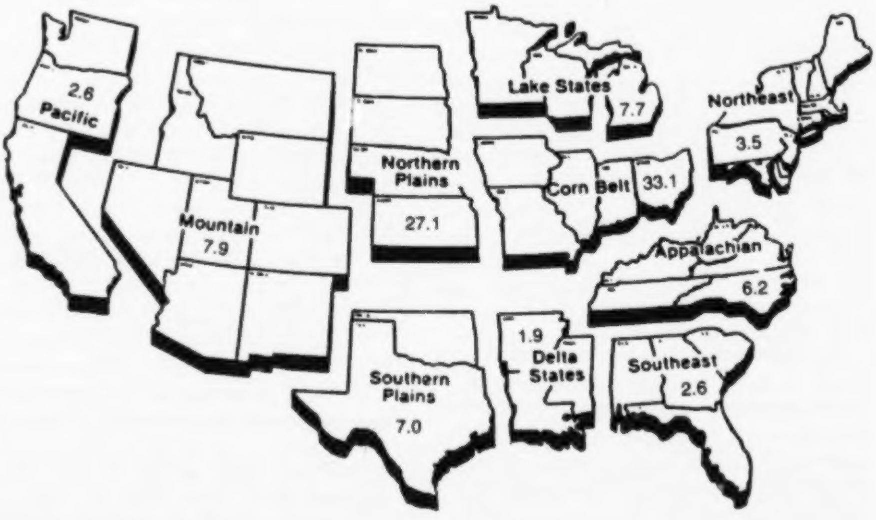
Reporting the highest percentage of acres under all methods of conservation tillage compared to the total planted acres in a State were Delaware and Maryland, first and second, respectively. Delaware reported 73 percent of its planted cropland under conservation tillage.

The Southern Plains Region recorded a significant increase in strip-till acreage this year while strip-till acreage in the Mountain Region decreased by more than half.

The 1985 "National Survey of Conservation Tillage Practices" contains national totals, regional and State summaries, State/county summaries, and maps and pie charts. National and regional reports can be ordered in hard copy, on magnetic tape, or on floppy disks. Single State/county summaries and custom county summaries are available in hard copy or on floppy disk. Single State summaries without the county breakdown are available in hard copy only. A fee schedule is available on request from the Center at 2010 Inwood Drive, Executive Park, Fort Wayne, Ind. 46815, or telephone (219) 426–6642.

An executive summary of the report can be obtained from the Center at no charge. The summary contains only the national and State totals and their corresponding maps.

All Conservation Tillage



All Crops—Acres in Millions (Total—99.6)

Wildlife

Ducks by the Mcbucket

Wood ducks in Wake County, N.C., deserve a break today. And, with a little help from their friends, they're getting one.

The Wake Soil and Water Conservation District and local McDonald's Restaurants have teamed up to recycle empty pickle buckets into nesting boxes for wood ducks. The boxes are necessary because increased cutting of bottomland hardwoods in recent years has destroyed many natural wood duck nesting areas in the county.

Suitable artificial nesting structures can be built from wood or sheet metal, but these structures are expensive, time consuming to build, and bulky to transport. As a result, the district and the restaurants joined together in the fall of 1982 to produce an effective, economical, and easily transportable alternative to the old style structures.

The restaurants receive pickles in 5-gallon green buckets that are discarded once the pickles have been removed. When asked by the district, Wes Elam, who was then operations manager for the Raleigh region of the restaurant chain, arranged for the 5-gallon buckets to be saved. The district collected the buckets and converted them into nesting boxes.

Each structure requires two buckets. The top rim of each bucket is modified so that one bucket fits over the other like a huge medicine capsule. A 3½-inch hole is cut on the side of the top half, and drainage holes are drilled in the bottom half. For nesting material, 6 to 7 inches of wood shavings are placed in the bottom. The structures are then attached to posts, steel pipes, or trees. Shields are erected to protect the nests from predators.

The pickle-bucket boxes have several advantages over other nesting boxes. Since the top and bottom halves are secured in a press fit, the structures can be disassembled in seconds. The halves can be stacked inside each other like paper cups for easy transportation.

In addition to donating the buckets, McDonald's has also helped with promotion. A display built by the district using a nesting box and photographs has been placed in several of the restaurants. The district has promoted the boxes through local newspaper stories, personal contacts, and design sheets distributed at outdoor and farm shows.

The district sells the complete structures for $8.95 each plus shipping. It uses the money it makes to finance a college scholarship fund that has already awarded two $100 scholarships to students at North Carolina State University. Funds are also used for other educational programs in the public schools.

In 1983, the first year, 10 of the structures were installed around a pond in the southern part of the county. Wood duck hens nested in 9 of these and produced 106 ducklings. The following year, 300 ducklings were produced in 33 of the structures installed at adjacent ponds. An electric utility company purchased 20 boxes for use at Shearon Harris Lake. Thus far, 84 boxes have been sold.

Larry Petrovick,
soil conservationist, Wake Soil and Water Conservation District, Raleigh, N.C.

Empty pickle buckets are recycled as nesting boxes for wood ducks in Wake County, N.C.

Wood shavings serve as nesting material.

Wisconsin Launches Wildlife Enrichment Program

"Wildlife represents the difference between rich country and mere land. A thicket without the potential roar of a quail covey is only a thorny place," wrote an early conservationist, Aldo Leopold.

Nobody has to tell this to the farmers in Dodge County, Wis. Most remember when their land was rich and alive with an abundance of wildlife. And, by participating in a new wildlife program, many are determined to keep their farms from ever becoming just "mere land."

Dodge County is ridged from northeast to southwest with long glacial drumlins, interspersed with bulrush marshes and open water. This topography has historically provided ideal habitat for ring-necked pheasants, ducks, small game, and songbirds. In the late fifties, this habitat supported 30 to 50 pheasants per square mile. Now, with the drainage of many of the wetlands and the advent of new farming practices, only 3 to 18 pheasants per square mile remain.

To reverse this trend, an experimental project was started in 1984 to help Dodge County farmers re-enrich their land with wildlife. The Dodge County Private Lands Wildlife Project is a multiagency effort to encourage landowners to consider wildlife in their farming operations. Project managers hope to find and provide the right mix of cost-sharing, education, technical assistance, and communication necessary to reestablish wildlife habitat. Sponsors include the Wisconsin Department of Natural Resources (DNR), the University of Wisconsin–Extension, USDA's Agricultural Stabilization and Conservation Service (ASCS) and Soil Conservation Service, the Dodge County Land Conservation Department, and Wings Over Wisconsin (a sports club).

The project's feasibility is being tested in three areas. Pheasant and mallard counts in these areas will be compared for 6 years to counts in three similar control areas. If the project proves successful in Dodge County, plans call for it to be expanded to other areas of the State.

Since pheasants typically nest within 2 miles of winter cover, the study areas were drawn as circles, 2 miles in radius, centered on the winter habitat. Goals for each area are to establish at least 400 acres of nest cover, 30 acres each of cattail and shrub winter cover, 100 acres of duck brood water, and 4 to 6 acres of corn-sorghum food plots.

Pheasants require a mixed habitat to flourish: tall dense grass for nest cover, shrubby wetlands for winter cover, and a dependable supply of winter food. Mallards use the same type nest cover but also need a marsh with open water to raise their broods.

Maintaining quality duck wetlands will also help control soil erosion. Much of the land in the study is eroding at twice the rate considered the maximum acceptable. Project managers emphasize that by seeding the most erodible land to nesting cover, farmers can achieve both soil conservation and wildlife goals.

Most of the farms are dairy farms, but a few are in cash grain and vegetables. The average farm size is 180 acres.

In pre-project meetings, DNR Wildlife Biologist Todd Peterson and SCS District Conservationist Norbert Wozniak found that most of the farmers cared about wildlife but did not understand the causes of the decrease in wildlife populations, especially the effects of new farming practices. For example, few realized the devastating effect of intensive land use on wildlife habitat. Farming every odd acre in large fields cleared of hedgerows leaves little room for wildlife.

Peterson hopes to enlist at least half the farmers in the study areas to participate. "The project is a community effort," he said, "and will succeed if just some people each do a little bit. One farmer may plant an odd area to switchgrass nest cover; another may put in a food plot near winter cover; another may not do anything. As long as the four vital components—nest cover, winter cover, winter food, and brood water—are available in sufficient quantity and quality, bird numbers should increase."

SCS is working with participants to develop conservation plans that emphasize wildlife management practices. "Because of the natural features in the area, the farmers here have a great opportunity to bring the wildlife back," said Wozniak. "We're just showing them the best ways to do it."

There are 253 farmers in the study areas. Wozniak said that by the end of 1985 project representatives had visited 53 of the farmers and 19 had applied one or more of the recommended practices.

Participating landowners are eligible for

Many farms in Dodge County, Wis., have excellent potential for wildlife habitat.

special cost-sharing and land rental funds from ASCS and DNR. The best incentive, however, may be seeing the pheasants and mallards return to their old territories. More than anything else, that will prove to the farmers that, with just a little effort, conservation pays in clean water, reduced erosion, and land that is richer in wildlife.

Renae E. Anderson,
public affairs specialist, SCS, Madison, Wis.

Thomas P. Thrall,
biologist, SCS, Madison, Wis.

Indiana Study Shows Birds Prefer No-Till

No-till in southeastern Indiana provides habitat for a greater variety of birds than does conventional tillage. According to a recent study, the birds find food and cover in the crop residue that no-till leaves on the soil to reduce erosion.

In a project sponsored in part by the Soil Conservation Service, bird populations were studied for 3 years in corn and soybean fields in Scott County. Data were collected from 36 fields—9 each of conventional cornfields, no-till cornfields, conventional soybean fields, and no-till soybean fields.

More bird species were sighted in the cornfields than in the soybean fields in all seasons. During winter, 31 bird species used fields covered with no-till corn residue while only about half that many used tilled cornfields and fields with soybean residue. Fields with the heaviest crop residues were the most attractive to most of the bird species. Only two—the horned lark and killdeer—avoided fields with heavy residue cover. These species favored fields of disked corn residue or no-till soybean residue but showed almost no use of plowed or chiseled fields.

During the spring nesting season, a total of 31 bird species—not all the same as those seen in winter—were observed in the study fields. Some of the no-till fields provided suitable habitat for successful reproduction of ground-nesting birds such as meadowlarks, bobwhite quail, field sparrows, and song sparrows. One pair of yellow-throated warblers nested in a no-till cornfield with a cover crop of 'Emerald' crownvetch. Twice as many barn swallows were observed feeding over no-till fields than over tilled fields. Fall-sown cover crops of winter rye and wheat, which seem to offer little additional habitat in winter, are very attractive to nesting birds late in spring after there is substantial plant growth.

During the study, the percentage of ground cover was measured twice in each field, once before and once after spring planting. Crop residue left in the fields over winter varied from 0 to 100 percent cover, and averaged more for corn than soybeans. Residue cover was usually between 80 and 90 percent after 2 years of no-till corn. An aerially seeded cover crop of winter rye in corn residue usually increased the total cover to between 95 and 100 percent. Height of the residue cover, which is important to many species of birds and other wildlife, averaged 1 to 2 feet in the corn fields and about 4 inches in the soybean fields.

No-till leaves both waste grain and stalk residue. Waste grain is very important wildlife food during winter when food requirements increase and other foods are scarce. Some studies have shown fall plowing buries 98 percent of the waste corn left after harvest. During the spring and summer, birds and small mammals feed heavily on seeds, insects, and grubs when extra protein is required for egg laying and the production of young.

The study was a cooperative project by the Indiana Department of Natural Resources (DNR), the Scott County Soil and Water Conservation District, SCS, and private landowners. "The study was successful," said John Castrale, DNR research biologist and one of the principal investigators, "because of the team effort of all individuals and groups involved. We now know with some certainty that no-till provides better wildlife habitat than moldboard plowing."

Bird species attracted to the fields include eastern bluebird, cardinal, robin, bobwhite quail, mourning dove, dark-eyed junco, American goldfinch, flicker, downy woodpecker, tree sparrow, song sparrow, American kestrel (sparrow hawk), and eastern meadowlark.

James D. McCall,
biologist, SCS, Indianapolis, Ind.

During winter in southeastern Indiana, 31 bird species were observed in fields covered with no-till corn residue. Most birds are attracted by the food and cover provided by such heavy crop residues. The windbreak in the background provides diversity, another important requirement for wildlife.

Rhode Island Farm Produces Wildlife

Rhode Island, known to its residents as "the biggest little State in the Union," offers a wide variety of farming. In addition to its potential for crop, livestock, and woodlot operations, the State offers good opportunities for wildlife management.

Take for example the Addieville East Farm in Burrillville, a 470-acre hunting and fishing preserve operated by Geoff Gaebe since 1979. What makes this farm different from most others is its emphasis on wildlife habitat development. Gaebe grows corn and switchgrass specifically for the use of wildlife. His farm has increased the populations not only of upland game birds in the area but also of predatory birds, foxes, otter, and other nongame wildlife.

Gaebe believes his type of farm is about the only type that now provides for wildlife the way most farms used to. "Wildlife depends on agriculture, but farmers have gotten so good at what they do and are under so much economic pressure that they can't afford to consider the needs of wildlife anymore," he said.

The Soil Conservation Service became involved when Gaebe contacted the Northern Rhode Island Conservation District for assistance in farm planning and wildlife habitat development for pheasants. Over the past few years, Gaebe has received assistance through the conservation district with upland wildlife management, woodlot management, pond design, runoff management, field stripcropping, renovation of hayfields, diversions and waterways, tile drainage, and an access road.

Gaebe's bird habitat includes open fields with feed patches, buffer strips, second-growth timber, and mature forest. He personally designed large flight pens around the farmhouse and barnyard area to keep pheasants in as natural an environment as possible while in captivity. The design of the pens allows him to move thousands of birds in 2 hours, a job that used to take 8 to 10 hours.

Sometimes as many as 20,000 pheasants are introduced into the 10 acres of flight pens. When this happens, the birds strip all of the vegetation from the soil, which results in a high hazard of erosion. Incorporated into the design of the pens is a 2- to 4-foot-high screen that provides both a visual block to outside stimuli and predators as well as a very effective silt fence. The screen is made of porous fiberglass, a byproduct of the paper industry, and has proven very effective in controlling soil movement.

Because of careful design and management of the water resources on the farm, trout fishing is also an important aspect of the operation. Ponds designed with SCS assistance are kept well stocked with rainbow trout, and native brook trout can be found in a stream that crosses the property.

When asked about his plans for the farm, Gaebe said his plans have changed several times, taking new directions. One day soon he would like to raise beef cattle to utilize his hayfields. He is also looking into the possibility of producing birds that can survive in a woodland habitat rather than an agricultural habitat. Although the farm produces pheasants to sell to restaurants and cordwood to sell to homeowners, Gaebe said his main goal has always been an outdoor recreation facility based on hunting and fishing. He believes we will see more and more of this type of operation in Rhode Island and other States where the amount of uninhabited land is decreasing.

Eric Scherer,
former district conservationist, SCS, Greenville, R.I., now resource conservationist, SCS, Hartford County, Conn.

Improved Wildlife Habitat Spurs New Business

What began as an avocation has become a part-time occupation for farmer Bill Wolters. An avid hunter, Wolters recently converted 500 acres of his farm in Sussex County, Del., into a hunting preserve.

Opening the hunting preserve was a natural progression for Wolters, who has been cooperating with the Soil Conservation Service and the Sussex Conservation District on erosion control and wildlife conservation practices for well over a decade. On the 3,000 acres where he raises corn and soybeans, he has installed nine ponds, miles of vegetative filter strips along drainage ditches, and acres of wildlife food plots.

Wildlife habitat development on Wolter's farm goes back to 1973. At that time SCS conservationists were looking for farmers willing to plant demonstration plots of VA–70 shrub lespedeza, a new shrub developed for erosion control and wildlife food and cover.

"We were finding that a lot of natural hedgerows and odd brushy areas were being removed as farmers tried to maximize the efficiency of their operations," said Dick Bennett, SCS district conservationist. "This was eliminating wildlife habitat and opening up fields to wind erosion. Shrub lespedeza seemed like a good solution to both problems."

Wolters agreed to plant the lespedeza along a newly cleaned out drainage ditch. He planted this first plot to control erosion and trap eroded soil and nutrients carried in runoff from the adjacent cropland. "With all the runoff and high-powered chemicals we're using, we've got to have these strips along every ditch or someday we won't be able to get a glass of clean water," he said.

Such strips also keep maintenance to a minimum by reducing the amount of sediment entering the ditch. "Unlike grass filter strips, shrub lespedeza doesn't have to be mowed," Bennett said. "Its dense foliage keeps trees and other woody plants from getting started. This makes cleanout, when it is necessary, a lot easier."

Shrub lespedeza, which grows 4- to 6-feet tall, is a perennial with a semiwoody stem. Its seed pods mature in October but can take weeks to shatter, making food available to wildlife well into the winter. The stems bend with the weight of snow, providing shelter for rabbits and quail.

The plant's performance and its potential for wildlife habitat development so impressed Wolters that he agreed to produce seed so that it would be available to others. "It is the best cover in the world for wildlife," he said. "It provides nesting for rabbits and quail. Pheasants and doves love it."

During one season, Wolters harvested 260 doves and 40 quail from a 5-acre area bounded on three sides by shrub lespedeza. Today, in addition to having it along drainage ditches, he maintains a 10-acre plot of lespedeza in a 20-acre field planted with strips of other types of wildlife food plants such as buckwheat, sorghum, corn, and sunflowers. He is now a major commercial producer of shrub lespedeza seed.

In addition to birds such as pheasant, chuckers, and quail, which Wolters pen raises and releases, a wide variety of other species can be found naturally on his land. These include deer, ducks, geese, and doves.

The hunting preserve provides Wolters with a cash flow from September through midwinter, normally a period of lower farm income. Already drawing hunters from across the country, his preserve promises to be as profitable as his agricultural enterprises—if not more so.

"Less and less land is becoming available for hunting as more habitat is being taken out for agriculture," he said. "Office workers don't have time to look for a place to hunt, and young people are being denied the pleasures of the sport because they have no place to hunt and no one to teach them."

While good business sense played a part in his decision to use conservation practices, it wasn't his only motivation. Wolters is determined to conserve his natural resources and is convinced that conserving soil and developing wildlife habitat are compatible goals that more farmers should strive for. "Without erosion control," he said, "Americans are not going to have any farmland left."

Katherine Gugulis,
public affairs specialist, SCS, College Park, Md.

SCS and Wildlife Heritage Team Up for Waterfowl

On John K. Waters' farm, waterfowl is as important a crop as corn and soybeans. In fact, one of the reasons Waters moved last year to Easton, Md., near the Chesapeake Bay, was to hunt ducks and fish oysters.

He soon found—to his dismay—that an old goldfish pond behind his house attracted mosquitoes and frogs, but no ducks. So Waters turned to the Soil Conservation Service and a private group, the Chesapeake Wildlife Heritage, for help in building a pond that would attract waterfowl.

SCS and the Wildlife Heritage, through the Talbot Soil Conservation District, helped Waters develop a comprehensive plan for wildlife management. The plan includes recommendations for building a pond and fluctuating the water level to encourage plant growth and attract ducks.

The Wildlife Heritage has a fulltime interest in waterfowl habitat management and cooperates with SCS in developing detailed management plans for waterfowl. "When field personnel from SCS and the Wildlife Heritage visit a farm, we can help the landowner make decisions and come up with a management plan," said Paul Petrichenko, SCS district conservationist for Talbot County. "After planning has been accomplished, SCS engineers design a pond to meet the landowner's goals and the Wildlife Heritage helps implement the plan."

The primary interest of the Wildlife Heritage is creating habitat for dabbling ducks, and most of its clients are absentee landowners who don't have the time or expertise to manage their ponds for wildlife. The group helps to manage more than 25,000 acres of farmland and marshland in Maryland, as well as projects in Delaware and South Carolina.

"Our forte is implementation," said Ned Gerber, a biologist for Wildlife Heritage. "That means everything from helping the landowner get the proper permits, planting appropriate vegetation, and hiring a contractor to build the pond to putting up nesting boxes."

The nonprofit group raises funds through a waterfowl festival and client donations. Gerber said donations average about 10 percent of the pond cost. "But we don't insist on that," he said. "If cost is a deterrent, we're more interested in getting the wildlife practices installed than in getting a donation."

Petrichenko and Gerber are pleased with the special working relationship between their organizations. "Our goals are compatible," said Petrichenko. "Ned's selling soil conservation just like we are because it improves water quality for waterfowl by keeping sediment and nutrients out of ponds and streams."

Most clients of the Wildlife Heritage request SCS help in developing complete soil conservation plans for their farms. Waters, like many farmers in the Chesapeake Bay area, is especially concerned about siltation. "I live at the head of the Miles River and every day I see evidence of siltation," he said. "Around our boat house at low water we barely have 2 feet of water where there used to be 6."

Waters plans to install grassed waterways to prevent erosion in his crop fields and to plant loblolly and yellow pine trees along the river to serve as a buffer strip. The pond will also help filter sediment and nutrients from the runoff before it reaches the river.

"Ponds act as a barometer of what is occurring in the environment," said Petrichenko. "If the pond begins to silt in and become filled with algae, it is bad for waterfowl. It also means that soil and nutrients are washing off the land. And if the pond is filling up with soil and nutrients, then you know the same thing is happening to the creeks that feed the larger rivers and the Chesapeake Bay."

Katherine Gugulis,
public affairs specialist, SCS, College Park, Md.

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New Publications

Engineering Models for Agricultural Production

by Donnell R. Hunt

The technical level of this textbook is suggested as the beginning of the third year of a 4-year collegiate program. The book emphasizes the application of physical science and technology through mathematical modeling. It focuses on the importance of systems modeling in designing equipment and procedures to achieve efficient agricultural production.

Topics include mathematical modeling of field machinery systems, field operations, engineering economics, analogs, stochastic systems, calculus, scheduling, and game theory. Frequent problem sets and detailed modeling projects are provided.

This 260-page textbook is fully illustrated with photographs, tables, charts, and graphs.

Copies are available for $37.50 from AVI Publishing Company, 250 Post Road East, P.O. Box 831, Westport, Conn. 06881.

Warm-Season Grasses: Balancing Forage Programs in the Northeast and Southern Corn Belt

by the Soil Conservation Society of America

According to the seven plant experts who wrote this booklet, warm-season grasses are comparable or superior in forage quality to cool-season grasses. Supplementing cool-season forages with warm-season grasses can enhance livestock production and provide other benefits. The booklet explains how warm-season grasses can be used for wildlife plantings, reclamation, and other conservation uses. The performance of these grasses and descriptions of breeding programs to develop better-adapted cultivars are also reviewed.

This booklet should be a useful guide to farmers and ranchers, conservationists, extension personnel, and others who work with landowners and managers.

Copies of this booklet are available for $5 ($4 for Soil Conservation Society of America members) from SCSA, 7515 N.E. Ankeny Road, Ankeny, Iowa 50021-9764. (Discounts on quantity purchases are available.)

Agricultural Topics for Science Fair Projects

by John A. Maday,
University of Florida

This booklet was developed to encourage students to choose agricultural topics for their science fair projects. It consists of two parts. First is a list of faculty members from the University of Florida, Institute of Food and Agricultural Sciences, who have offered to serve as resource people for students planning science fair projects. Second is a list of questions, problems, or topics which could serve as a basis for a science fair project.

Single copies of this booklet are available from the Agribusiness Institute of Florida, Inc., Liberty Square, Suite 201, 1137 Bartow Highway, Lakeland, Fla. 33801.

The Environment, Public Health, and Human Ecology: Considerations for Economic Development

by James A. Lee

As a development finance institution, the World Bank wants to ensure that consideration is given to the environmental, health, and social consequences of every development project proposed for financing and that potentially adverse impacts are avoided or mitigated. The Bank has designed this handbook to provide guidance in the identification, detection, measurement, and control of adverse environmental effects. It is a general survey of the environmental, health, and human ecological impacts of development projects in sectors such as agriculture, industry, energy, and urban development (including water supply, sanitation, and transportation).

Chapter 1 describes the World Bank's policy of sustainable development and its internal project cycle review. Chapter 2 examines four environmental problems caused primarily by industrial and energy-related development projects: air pollution, water pollution, solid waste disposal, and noise pollution. The direct and indirect health risks to the inhabitants and workers in the project areas are discussed in Chapter 3. A discussion of some of the possible adverse effects of tropical agricultural development and ways to mitigate them is given in Chapter 4. Chapter 5 provides a framework for analyzing the environmental impacts associated with a wide variety of industrial development projects in developing nations. The environmental damage associated with the exploration, mining, and development of fossil fuels is discussed in Chapter 6; and Chapter 7 discusses the planning tools available for managing urban and regional development. The handbook concludes with two appendixes and a bibliography.

Project planners, government policymakers, economists, and lending officers in financial institutions should find this book useful.

This 288-page handbook is available for $14.95 from the World Bank Publications Department, 1818 H Street, NW., Room H–2171, Washington, DC 20433.

Baybook: A Guide to Reducing Water Pollution at Home

by the Citizens Program for the Chesapeake Bay

"Growing commercial, industrial, recreational, and urban activities in the Bay area are putting substantial pressure on the Bay's fragile ecology. It's time we stopped taking the Bay for granted." These statements are from a guide that was developed for the people who live in the 5 million households around the Chesapeake Bay.

A comprehensive study by the U.S. Environmental Protection Agency verified that the Chesapeake Bay has been seriously harmed by environmentally unsound decisions made in the past.

Since the Federal and State governments announced their plans to clean up the Bay, the public's enthusiasm to do its part has grown.

Baybook shows how families can make changes in daily household routines to help improve the quality of water flowing into the Chesapeake Bay, thus preserving and restoring the Bay. It gives information on erosion control, soils, drainage, septic systems, pavement, landscaping, lawns, gardening, household chemicals, water conservation, recreation, and community action.

The guide warns, "If we don't take steps now to improve the quality of the water in the Chesapeake Bay, the waters may one day be gone."

Single copies are available, while supplies last, from the Citizens Program for the Chesapeake Bay, Inc., 6600 York Road, Baltimore, Md. 21212. Readers are encouraged to reproduce all or parts of *Baybook* for use in citizen organization newsletters or as handouts at community meetings.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986—490-922/40002

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June 1986 Volume 7, Number 3

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service

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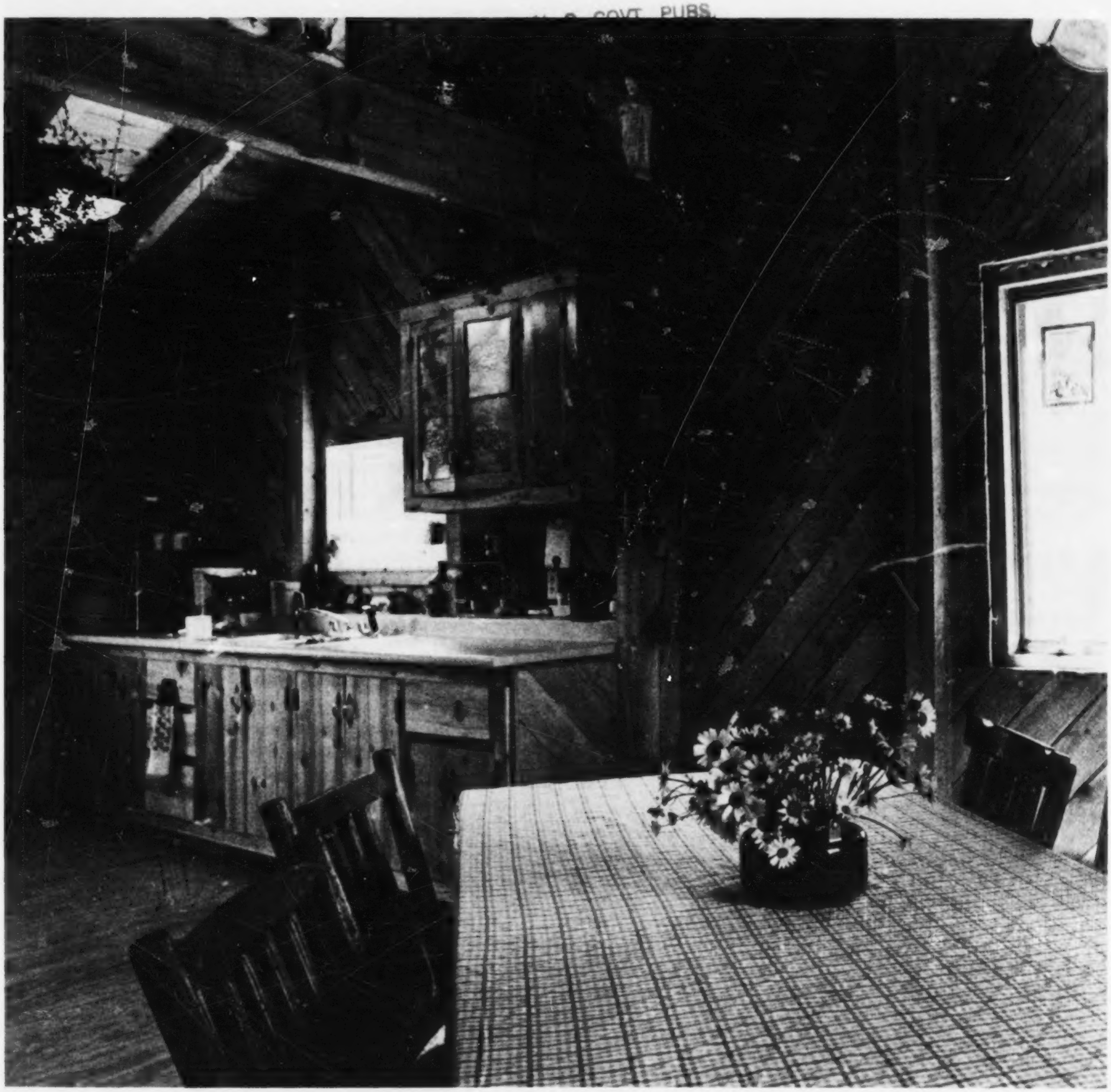

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN–0199–9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013–2890.

Subscriptions
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Comments:
From the SCS Chief

Cooperation Keeps Conservation Tillage Growing

Farmers used some form of conservation tillage on nearly 100 million acres in 1985, just about one of every three acres planted in crops. Supporting their efforts are the U.S. Department of Agriculture's Agricultural Research Service (ARS), Cooperative State Research Service, Extension Service, Agricultural Stabilization and Conservation Service, and Soil Conservation Service as well as conservation districts and private industry.

Experience shows that all forms of conservation tillage don't work equally well everywhere, and when row-crop farmers in the Central United States had reduced yields under no-till on their heavy, poorly drained soils, agricultural scientists coupled with private industry and interested farmers, went to work on the problem.

The result was another form of conservation tillage, ridge-till, which produces competitive yields in these areas. The seed is planted in a raised ridge where the soil can dry out and warm up sooner in the growing season.

Farmers really like ridge-till: The Conservation Tillage Information Center in Ft. Wayne, Ind., a special project of the National Association of Conservation Districts, reports that in 1985 there was a 45-percent rate of growth in the practice. More than 75 percent of that increase was in the Corn Belt and Northern Plains States.

Agricultural researchers are continuing to develop the information farmers need for choosing the best conservation tillage system for their soil, increasing the effectiveness of fertilizer through proper placement, and improving weed control. Extension is doing a good job of getting this information to farmers.

Research shows that applying more herbicides does not necessarily provide better weed control. ARS scientists and scientists at State agricultural experiment stations say that adequate weed control requires a combination of crop rotations, proper timing, and the right herbicide. This means that careful management can reduce the amount of potentially harmful herbicides introduced into the environment as well as cut costs.

SCS field people who are directly helping farmers fine tune their conservation tillage systems need to keep track of the latest research results about soils, climate, crops, and other conditions in their area. Together, we can make sure that farmers and ranchers get the accurate, up-to-date information and expert assistance they need to manage these soil-saving systems well—and we can relay their questions and good ideas to research scientists.

Wilson Scaling

Cover: Low-cost, energy efficient house built with local lumber in north-central New York. This house is one of the models for a new building kit being developed by the Black River-St. Lawrence Resource Conservation and Development (RC&D) Area. Articles about this and other RC&D projects begin on page 3. (Photo by Karen Rusinski, audio-visual production specialist, SCS, Syracuse, N.Y.)

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

All programs of the U.S. Department of Agriculture are available to everyone without regard to race, color, national origin, sex, age, or handicap.

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RC&D: Making Things Happen

The Resource Conservation and Development (RC&D) Program is a Federal rural development program that is run by the people who live in the areas it serves. Priorities for the program are set not by the Federal Government but by the men and women who are experiencing the problems firsthand.

The RC&D Program was established by the Food and Agriculture Act of 1962. This act authorizes the U.S. Department of Agriculture (USDA) to help local units of government to conserve and properly use natural resources in solving local problems. It assigns the leadership role to the Soil Conservation Service.

Each RC&D area usually covers several counties and is run by a council representing the sponsoring organizations—county governments, soil and water conservation districts, towns, water districts, and other nonprofit groups. Council members commonly include farmers, ranchers, bankers, politicians, homemakers, environmentalists, and others who are volunteering their time to solve local problems.

RC&D councils have broad authority to seek help from the sources they feel are best qualified to provide the needed assistance. The help may be technical assistance from USDA agencies, the State government, local governments, local conservation districts, or private industry. It may be financial assistance in the form of donations, loans, grants, or cost-sharing programs.

The council in each area is assisted by an RC&D coordinator, a USDA employee whose job is to "make things happen." This person is a planner, proposal writer, negotiator, innovator, motivator, creator, expediter, and whatever else the council needs. The coordinator is a troubleshooter who may work odd hours, traveling to meet key people to keep projects on schedule.

In many areas, one of the main RC&D goals is to improve the local economy by the wise development and use of local resources. This is done in many different ways, such as by developing wood products industries in areas with an abundance of forest land, promoting tourism in scenic areas, or setting up cooperatives for marketing livestock. Other RC&D goals may be to improve the quality of life or conserve natural resources.

Next year will mark 25 years of RC&D activities. This is the first part in a two-part series of articles about some of the ways the RC&D Program has "made things happen" in rural communities across the Nation. This part highlights economic development. The second part will concentrate on RC&D activities to improve the quality of life and conserve natural resources.

Ron Page,
national RC&D coordinator, SCS, Washington, DC

Building a New Housing Industry

In north-central New York, the RC&D Program is helping to build a new industry based on the area's abundant forest resources and pressing need for housing. The Forestry Committee of the Black River-St. Lawrence RC&D Area is laying the groundwork for a pre-cut-and-packaged post-and-beam house kit industry.

The RC&D area encompasses 2.7 million acres of commercial forest land and about 90,000 households in Franklin, Jefferson, Lewis, and St. Lawrence Counties. Only half the annual growth of wood is harvested each year, and most of this is exported from the area as raw wood products, such as logs, pulpwood, or rough-cut unseasoned lumber. Rural housing in most of the RC&D area is old, underinsulated, and in general disrepair.

About 5 years ago, the St. Lawrence Housing Council began a project to improve the housing in St. Lawrence County. The Housing Council thought that one answer might be a design for a post-and-beam-style house (a traditional building style throughout the area) with a modern insulation package.

The Housing Council began designing small houses and trailer add-on units to be built with a combination of owner and Housing Council labor. All the designs incorporated modern, simplified construction methods to make it easier for owner-builders to erect the homes. The building materials were to be inexpensive, locally milled, rough-cut, unseasoned lumber.

The RC&D Forestry Committee saw the Housing Council's program as a basis for a new wood-using industry that would generate more dollars and jobs for the local economy. The Housing Council's model homes were proving to be attractive, sturdy, extremely energy efficient, and low maintenance. The homes were

An employee of the St. Lawrence Housing Council prepares to install a bathroom in an add-on unit being built alongside a house trailer. Housing designs by the council incorporate modern, simplified construction methods and call for the use of local lumber.

Photo by Karen Rusinski, audio-visual production specialist, SCS, Syracuse, N.Y.

inexpensive, and new owners were pleased with them.

The Housing Council estimated that a post-and-beam home built with locally milled, rough-cut lumber would cost about $30,000 if built by a contractor, exclusive of land and site preparation. With owner-supplied labor, the cost would drop to about $23,000. The lowest price quoted by an existing post-and-beam house kit manufacturer was $40,000, and that kit had only half the insulation R-value of the Housing Council homes. Most kits sell for $50,000 or more.

Encouraged by these figures, the Forestry Committee decided to provide technical and financial assistance if a private entrepreneur could be found to produce and sell the kits. This assistance is to include a design package, market study, and business plan.

To launch the project, the committee secured three grants. A total of $35,700 came from USDA's Forest Service in two grants administered by the New York State Department of Environmental Conservation's Division of Lands and Forests. Another $10,000 came from the Adirondack North Country Association, a public interest group that promotes economic development in New York's North Country.

The design package includes blueprints, materials lists, construction costs and techniques, and other technical information. The market study will determine the market potential for the home kit and identify secondary products, such as barns, sheds, additions, and playground sets, that could improve the profitability of the venture. The business plan will analyze start-up costs, growth potential, existing competition, promotional and sales techniques, overall profit potential, and other considerations.

All of this material will be public information, available to all prospective entrepreneurs to use and study. The committee has reserved $5,000 to help one carefully selected entrepreneur get started. This prospect will be selected by the committee as the one most likely to succeed with the project.

Throughout the project, the State of New York has provided continuous support through its Department of Environmental Conservation's Forest Products Utilization and Marketing Section. The State was also cooperative in revising regulations against the use of informally graded lumber that could have stymied the project. This was the traditional building material used for generations in rural homes, and is the same lumber called for in the post-and-beam kit design.

Tony Esser,
RC&D coordinator, SCS, Watertown, N.Y.

Housing for a family of four is provided by this post-and-beam style house designed by the St. Lawrence Housing Council. The family moved from a house trailer and plans to finish the floor and window casings later. Two layers of sheet insulation are between the interior and exterior walls.

Photo by Karen Rusinski, audio-visual production specialist, SCS, Syracuse, N.Y.

Converting Sawdust to Gas

Sawdust—a troublesome waste product of the sawmill industry—has become an asset for southeastern Missouri.

With assistance from the Bootheel RC&D Council, a 700-million-BTU wood gasification plant has been built near Bloomfield to convert sawdust into clean-burning gas. The Alternative Gas Company of Washington, DC, buys the sawdust, converts it into gas, and sells the gas to a cat litter manufacturer.

The gasification plant consumes about 20 trailer loads (200 tons) of sawdust a day. The RC&D council helped locate enough sources of sawdust to satisfy this demand for years to come. One source was a 150-foot-high pile that was causing a serious pollution problem on the Current River, a recreational stream about 60 miles to the west.

The gas meets or exceeds all local and Federal pollution standards and saves the consumer 20 percent ($2,000 per day) in energy costs. It burns in a leaner mixture than natural gas and creates virtually no sulfur or heavy metal byproducts that get into the air.

The gasification plant, which is adjacent to the cat litter manufacturer, operates by blasting a mix of sand and sawdust into an oxygen-starved environment at 1,200 to 1,300 degrees Fahrenheit. This produces carbon monoxide and hydrogen, about 90 percent of which is recovered to fire the kilns that dry the clay used in the cat litter.

This new use for sawdust has brought new industry to the area. It is also helping sawmills to properly dispose of their sawdust without polluting the surface and groundwater, which should keep more of the sawmills in business and more jobs in the area.

James E. Callahan,
RC&D coordinator, SCS, Dexter, Mo.

Linking New England and the Canadian Maritimes

Washington is Maine's most eastern county. It is a sparsely settled link between New England and the Canadian Maritimes.

The county covers 2,915 square miles and is dotted with small, peaceful towns rich in history and beauty. The land is 90-percent forested, and the major economic sources are wood-using industries, a wild blueberry industry, and hunting and coastal fishing.

This Down East Maine coastal county is served by three major highways, and many tourists visit areas nearby. To the south are popular Mount Desert Island and Acadia National Park. To the east are Campobello Island, with Roosevelt Campobello International Park, and the Canadian Maritimes. Local citizens feel that much can be done to attract tourists to Washington County as well.

In the summer of 1984, a tourism subgroup of the Governor's Task Force on the Economy of Washington County came to the Down East RC&D Area Council for help in developing tourism. The two groups agreed to publish information about the county's attractions and facilities and to revitalize an indebted and inactive local chamber of commerce.

The RC&D council and the Washington County Regional Planning Commission developed a questionnaire and distributed a copy of it to a key person in each municipality to obtain basic tourist information.

Once compiled, the information on lodging places, eating places, campgrounds, park and picnic facilities, boat access sites, trails, historical sites, entertainment, scenic views, sporting highlights, and other points of interest was published in a 150-page tourist guide. Copies of the guide—as well as posters and displays—were distributed to tourism organizations statewide.

Meanwhile, the Governor's task force subgroup arranged for three major creditors to clear the financial obligations of the former chamber of commerce. A new Washington County Chamber of Commerce with a new board of directors is now functioning, and enthusiasm is high for developing tourism.

Thomas C. Sweetser,
RC&D coordinator extension agent,
SCS, Cherryfield, Maine

Trying New Crops in Iowa

Iowans are well known for their ability to produce crops. Yet they import 80 to 90 percent of the fruits and vegetables they eat.

This reflects a dramatic change from the year 1919, when Iowa ranked fifth in the United States in commercial vegetable production. Up until the 1940's, the State ranked seventh in number of canneries. Today it's difficult to find a cannery in Iowa.

"Those statistics say to me that something other than corn and soybeans can be grown, and grown well, in Iowa," said Ric Zarwell, RC&D coordinator with SCS in Burlington.

"It's mostly that many other crops haven't been tried in a big way. In the RC&D area here, we believe a profitable agriculture is a prerequisite for good soil and water conservation," Zarwell said. "So, knowing there is an overproduction of corn and soybeans, we're helping people in the four-county Geode Wonderland RC&D Area look at alternative crops."

The idea was spawned a year ago as the depressed agricultural economy worsened. "We really got to thinking about alternative crops seriously last year, after the RC&D council sponsored seminars on growing shiitake (pronounced she-tah-kay) mushrooms. More than 1,200 people attended those seminars, and the interest was tremendous," Zarwell said. He added that 340 people became growers of the popular, edible mushroom last year, ordering 980,000 "plugs" to insert into small logs to begin their ventures.

"We'll have four meetings this year, too. We're bringing in an expert from California with the latest Japanese technology on growing the mushroom, and we expect to be swamped with interest again this year," Zarwell said.

The shiitake mushroom experience led to more thoughts on "new" crops. In Henry County, with RC&D help, seven farmers grew catfish in their farm ponds and then sold them locally. The farmers bought the catfish at a 6-ounce, fingerling size in late May, placed them in floating cages 4 feet deep and 3 feet in diameter, and fed them pellets daily. By the beginning of September, the catfish were 1½ to 2 pounds and ready to sell.

"The farmers sold them live or dressed at a local farmer's market and at the Old Thresher's Reunion celebration, and they plan to do it again next year," said Zarwell. "Catfish farming isn't new, but this idea of fast growth in cages is new to Iowa."

This past November, the RC&D council sponsored the first Agricultural Diversification Exposition in Iowa. The 2-day seminar, which is now planned as an annual event, drew 400 people. Workshops covered such topics as catfish, popcorn, commercial fruits and vegetables, Christmas trees, and forage crops. Also discussed were growing shiitake mushrooms, using regenerative agriculture, and marketing alternative crops.

"New ideas keep coming up as interest grows," Zarwell said. "This year, RC&D will help grow some amaranth, a plant with very high protein content. It looks like it has potential."

The RC&D has published a 109-page manual to help promote alternative crops. The manual, "Spotlighting Alternative Crops," provides information on how to grow and market about 20 vegetables, 3 fruits, 6 forages, 3 grain crops, and several specialty crops and herbs.

"The manual lists the alternative crops with the most potential for Iowa, but we think it can be applied from Ohio to Nebraska," Zarwell said. "It includes the shiitake mushroom, Christmas trees, popcorn, ginseng, amaranth, and many other alternative crops, and we think it will help any grower."

Interest has grown to the point that the Geode Specialty Growers Association has been formed. The association plans to staff an information center for high potential crops.

"The kind of interest we've seen in alternative crops in just 1 year makes me think the information center and our other seminars are something that will make a difference in our rural economy," Zarwell said. "It's an exciting concept to work with."

Lynn Betts,
public affairs specialist, SCS, Des Moines, Iowa

Meeting the Demand for Wildrice

Airboats and waders are some of the tools needed for a new agricultural industry in northern Idaho's Benewah County. The new industry involves harvesting and marketing wildrice.

Wildrice was introduced into this area 20 to 30 years ago to provide food and habitat for wildlife. It grows in wet areas around lakes and marshes. A few years ago the St. Maries Wildrice Growers Association was formed to begin harvesting the wildrice.

The wildrice is harvested using airboats with a trough on the front. Several passes are made and the ripe seed falls into the trough. The seed is then laid in windrows for a 3- to 10-day drying period. It is then parched, dehulled, graded, separated, and packaged.

Wildrice has been harvested commercially in other areas for a long time. Northern Minnesota is well known for its wildrice production. The wildrice grown near St. Maries, which is longer grained than the Minnesota variety, qualified for a premium rating. Its high quality commands a high price and has earned it a special niche in a rapidly growing market.

As demand and markets for this wildrice grew, the growers saw the need to expand. The expense of shipping the harvested rice to facilities in Minnesota for processing, however, was a major obstacle.

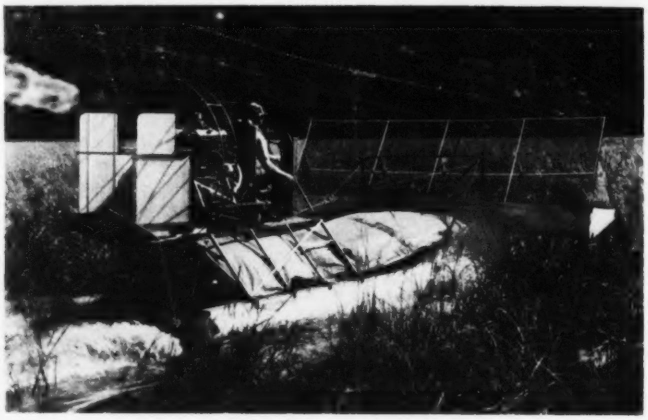
For assistance, the growers approached the Benewah Soil and Water Conservation District and the Idaho-Washington RC&D Area. They sought—and received—support in three areas: determining the potential environmental impacts of increased wildrice production on the water, soil, and wildlife; identifying sources of funding to build a local processing plant; and developing a new industry in a high unemployment area.

The appropriate State agencies, such as the Department of Fish and Game, the Department of Water Resources, and the University of Idaho Experiment Station at Sandpoint, were then asked to address the short- and long-term effects of increased wildrice cultivation. Their responses indicated that there didn't appear to be any significant adverse effects. In fact, wildrice cultivation could benefit wildlife.

The RC&D council set up meetings with local bankers and the Panhandle Area Council, an economic development agency in northern Idaho. Through these efforts, a corporation formed by the harvesters obtained the money to build the processing plant in the fall of 1984.

The new plant processed 60,000 pounds of wildrice during 1985, and the owners are considering expanding its capacity to handle 100,000 pounds. Together with the harvesting operation, it has created four full-time jobs and six to eight part-time jobs.

The wildrice is available in retail quantities locally and is marketed in large quantities all over the country. Packagin which is done at the plant, ranges from 8-ounce gift boxes and 25-pound bucke to 100-pound bags. Gourmet food consumers create the largest demand.



Airboats are used to harvest wildrice in northern Idaho. Several passes are made, and the ripe seeds fall into the trough in front. A new plant has been built to process and package the wildrice for national distribution.

Gerald T. Johnson,
RC&D coordinator, SCS, Coeur d'Alene, Idaho

Developing the Missouri Bootheel

Missourians are developing the "Boothe region in the southeastern part of their State. The Bootheel, which contains 9.6 percent of the State's cropland, now produces 25 percent of the State's $2-billion annual agricultural income.

A good example of the development taking place in this area is the wine industry. A new million-dollar Bavarian-style winery along Interstate 55 near Benton is producing prize-winning wines

In 1982, the Bootheel RC&D Council assisted the Moore-Dupont Company wi the planning and conservation work to establish a new 85-acre vineyard of Catawba and French-American hybrid grapes. The company is now producing grape, apple, honey, and peach wines a has built a second winery near Springfie to produce champagne.

The original conservation work include a pond for water supply; a diversion to help fill the pond and reduce erosion; ar contour grape plantings to get better air drainage and reduce erosion. The RC&D council located sources of rice hulls that are used in pressing grapes and apples. The company also purchases local hone

The company's future plans include a tourist center to promote the local wine industry and a tasting gallery. The RC&D council is furnishing promotional assistance to attract more of the 2 millior tourists traveling by yearly on Interstate 5 Many of those who stop for the winery w also spend money on other products anc services in the Bootheel.

James E. Callahan,
RC&D coordinator, SCS, Dexter, Mo.

Promoting Vermont

Tourism and agriculture in Vermont traditionally make strange bedfellows, but at the Green Trails Inn, Brookfield, the opposite holds true. Innkeeper Jack Russell encourages visitors to "stay another day" and partake of the "Vermont Experience." He invites the tourists to visit a family farm, hug a calf, and meet some very special people—Vermont farmers.

Working with the George D. Aiken RC&D Area and the local chamber of commerce, Russell and Dennis Borchardt, RC&D coordinator, have embarked on a marketing venture to sell Vermont—Vermont style. A video tape provided to area inns, campgrounds, information booths, and real estate offices, treats visitors to an overview of what the area has to offer.

"What we have attempted to do is take the mental picture that the world has of Vermont and capture it on tape," said Borchardt. The video, coupled with a self-guided tour brochure, encourages the visitor to "Stay Another Day"—the underlying theme of the campaign. Other promotional items include window stickers, placards, and T-shirts.

The "Vermont Experience" began in July of 1985 in the Greater Randolph Area—a group of villages in a central Vermont valley. Donations from prospective participants were solicited, and committees were formed to produce the video and brochure. The University of Vermont's Agricultural and Resource Economics Development Program provided technical help. USDA's Economic Research Service provided financial support. With volunteers doing the leg work, the entire package cost less than $2,000.

If people are looking for discos, video games, hot tubs, paved roads, and a swinging night life, they won't find it here. "We are what we are and we're Vermont," said Russell. "And we don't offer anything except Vermont.

"We're providing a destination that has food, craft shops, and antique shops," Russell said. "But we've added another dimension to it and that's agriculture. We're providing the visitor with an opportunity to experience the real Vermont. We attempt to get them out there—get them into the barnyard—walk, smell, and feel what the farmer does everyday."

Through direct contact with the farmers, the visitors learn of the hard work it takes to run a farm and of the troubles farmers are having. They also learn that farming is not without its humor. One gentleman, upon walking into a barn, exclaimed, "Why, I can tell they really keep this barn clean! It has a fresh ammonia smell."

More than 40 businesses in the area now participate, and more and more are expressing interest. The "Vermont Experience" is fostering civic pride and an interdependence among the local citizens. Cooperative efforts among townspeople helped generate a successful beautification project and merchants and businesses rely on each other's services, putting their money right back into the community.

For example, the Green Trails Inn, which serves 3,000 to 4,000 guests annually, buys eggs, dairy products, and maple syrup from local producers. Visitors go to local orchards to pick apples or buy fresh baked goods. Organically grown meat from Vermont is finding its way to other States because of visitors who tried it here, liked it, and now order it direct.

The "Vermont Experience" is a winner for the visitors, local businesses, villages and communities, and, of course, agriculture. It's also a way of saying, "This is our way of life. This is worth something. It's worth holding on to."

Ann Dudas,
public affairs specialist, SCS, Winooski, Vt.

Forming Haygrower Groups

Haygrower groups are blossoming in Iowa nearly as quickly as the alfalfa hay they grow and sell. Aided by RC&D areas, six multicounty haygrower associations are now in operation across the State.

It all started several years ago when the Pathfinder RC&D Council began looking for ways to stimulate the local economy. The council found that there was a market for top quality hay. In fact, when queried by the RC&D council, several buyers wanted to take delivery of large quantities immediately. As a result, the council formed a steering committee that contacted buyers and encouraged hay growers in the area to organize.

The first haygrower group was formed in 1983 in Cantril. About 70 farmers, mostly from Van Buren County, agreed to a set of bylaws and called themselves the Southeast Iowa Haygrowers Association.

"Their goals as a group are the same as the individual farmers involved," said Dale Kraus, RC&D coordinator from Fairfield. "But as a group, they have a better chance of reaching them."

The Southeast Iowa group strives to (1) promote the production of high quality hay, (2) develop better markets for their hay and straw, (3) conduct educational programs and exchange information on growing and marketing hay, and (4) encourage more soil conservation by increasing hay acreage.

Hay acreage in Iowa has dropped by 30 percent in the past 20 years. Most of those acres have been converted to the cash grain crops of corn and soybeans.

"But if you'll manage hay as carefully as most farmers manage corn and soybeans, you'll get a decent profit," said Tom Spear, a Tipton farmer. Spear is chairman of the Eastern Iowa Hay Growers Association.

The Eastern Iowa group has a computerized listing of all members' hay, and encourages all members to get their hay lab tested for quality. "You really can't tell the quality of hay by looking at it. We want to develop a reputation for high quality hay, because it will sell," Spear said.

Spear and others would like to sell most of their hay within Iowa, but an increasing amount is going out of State. This year, their group had all their members' hay sold by Christmas, much of it to Wisconsin farmers who were hit with heavy snow in early winter.

Lynn Betts,
public affairs specialist, SCS, Des Moines, Iowa

Marketing New York Beef

More and better beef means more and better markets for beef producers in southwestern New York thanks to an RC&D Custom Feedlot Demonstration Project. The project showed producers they could improve their profits by offering animals of consistent quality in quantities large enough to attract buyers.

"New York has the land resources to grow quality beef," said Robert Yunker, chairman, Seneca Trail RC&D council, "and we're close to major northeast markets." Yet most beef that New Yorkers eat comes from the Midwest. Indeed, many New York calves are sold out of State to be returned later as higher priced, finished beef, ready for the supermarket. Meanwhile, New York producers are faced with low prices and uncertain markets.

The RC&D council surveyed 250 beef producers in Allegany, Cattaraugus, and Chautauqua Counties and found that a lack of marketing options and expertise were the biggest problems. Producers couldn't consistently supply enough animals at market-specified grades when needed. They had difficulty producing animals that met USDA grading standards. Many mismatched cattle type and feeding programs or purchased the wrong feed ingredients. The decision to sell was often triggered by the need for money or shortage of feed, leaving little time to find a good market or coordinate shipping to save costs.

Believing that these problems could be overcome, the RC&D council organized a Beef Marketing Action Committee. This committee, made up of local beef producers, decided to prove that local producers could finish their own feeder calves in a well-managed common feedlot and sell them profitably in groups as animals reached the proper market grade.

A local cash-crop farm was chosen as the feedlot site and a local producer's co-op was selected as the marketing representative. The New York Department of Agriculture and Markets provided a marketing specialist to advise on grading and marketing. Cornell University provided an Extension beef specialist to develop a balanced feeding program to improve weight gains. A contract was drawn up for producers who wanted to finish cattle at the feedlot. Field days and information meetings were held at the feedlot with the help of Extension Service representatives.

The first group of 92 calves from nine producers was trucked to the feedlot in October 1983. The marketing specialist monitored progress and quality standards and determined when groups of cattle were ready for sale by the co-op. The results were encouraging. The cattle were sold at or above prices being paid in major cattle-feeding areas. On the average, producers received $101 per head in value added due to the feedlot.

In 1984–85, about 135 calves were finished and sold through the feedlot. Even though beef prices were depressed nationally, feedlot participants received an average of $73 more per head than they would have received without the feedlot program.

Ed Rayburn's experience illustrates what the feedlot project has meant to local beef producers. Rayburn, of Scio, runs a stocker cattle operation. He buys lightweight cattle in the spring and fall and sells them the following fall. Rayburn sold freezer beef for a while and was getting $1.35 per pound of cut, wrapped, and frozen beef. Through the feedlot, he can get $1.05 per pound hanging weight—without the marketing and preparation costs involved.

The success of the custom feedlot project shows what local people can do with a minimum of money and a lot of initiative. The project succeeded because of the cooperative spirit among the producers who consigned cattle, the co-op, the feeder, and the Federal, State, and local agencies. The overall benefits from the project have been estimated at $1.2 million, based on value added over the next 10 years.

In the future, the RC&D council expects to expand producer participation in the feedlot, and hopes to transfer responsibility for the program to the producer's co-op. The council is also sponsoring slaughter cattle and cull cow pools and is considering establishing a custom feeding program for lambs, modeled after the beef program.

Dale Clark,
RC&D coordinator, SCS, Franklinville, N.Y.

Jean Krebs,
information assistant, SCS, Syracuse, N.Y.

Pete Comerford, a livestock grading specialist with the New York State Department of Agriculture and Markets, grades a yearling feeder calf entering the RC&D demonstration feedlot. The calf has just been weighed and will be weighed again when it is sold for slaughter in 140 to 180 days.

Photo by Karen Rusinski, audio-visual production specialist, SCS, Syracuse, N.Y.

Nevada Farmers Make Irrigation Systems Work Smarter

In Nevada, municipal, industrial, and other nonagricultural users compete with farmers and ranchers for limited water supplies, especially in the rapidly growing southern and western parts of the State.

"The availability of water is a major factor limiting growth in Nevada," said Gerald Thola, Soil Conservation Service State conservationist in Reno. "With irrigation efficiencies in most of the State at less than 50 percent, farmers and ranchers must begin using water more efficiently."

In 1981, the U.S. Department of Agriculture's Soil Conservation Service and Agricultural Stabilization and Conservation Service (ASCS) began targeting technical and financial assistance to Nevada's major cropland areas irrigated by pumped groundwater and regulated streamflows.

Border Irrigation

Humboldt County is one of the areas being targeted for water conservation assistance. Average annual precipitation is 8 to 10 inches, and in some areas only 5 to 8. Irrigation provides almost all of the water for crops, and 80 percent of irrigation water comes from snowmelt. This usually runs out by July, and farmers begin pumping groundwater. In dry years, the water table falls below the reach of some pumps and they have to be lowered.

Many farmers in the county use center pivot irrigation systems. These are expensive to operate because of high energy costs and inefficient because of water loss to wind and evaporation. "Pivot systems were originally designed to provide supplemental irrigation, not all of a crop's water needs," said Terry Berogan, former SCS district conservationist in Winnemucca, Nev., and now SCS State information resources management coordinator in Bismarck, N. Dak.

"Farmers in Humboldt County need to apply 4 inches of water per irrigation, but pivots are designed to provide only 1 to 2 inches," said Berogan. "Border irrigation systems can be managed at up to 90-percent efficiency while most pivots in the area operate at 65 percent.

"Converting to a border irrigation system is really the best way to go," said Berogan. "But where farmers can't afford to switch, or won't, there are ways to make pivots more efficient. One way is to convert to a low-pressure, dropped-line sprinkler system which greatly reduces the amount of water that is lost to wind and evaporation.

"Farmers can apply the same amount of water to a smaller area more efficiently," said Berogan. "Since bigger drops of water can cause soil erosion problems on some fields, it's important for farmers to seek technical assistance before altering their pivot systems."

"Another way farmers can make sure their pivots are doing a good job is to ask SCS to do an irrigation evaluation," said Christian Pacheco, SCS soil conservationist at Winnemucca. "We set out rain gauges in the field to catch the water from pivots, record how much was collected in each, and enter that and other data into a computer program back at the office. It calculates the pattern efficiency, application efficiency, and system efficiency. From this we can determine if there's a problem that the farmer needs to correct, such as a worn nozzle."

Irrigation Scheduling

As part of the targeting effort in Nevada, SCS is also helping farmers to determine an irrigation schedule that will provide the most benefit to their crops from the irrigation water applied.

One farm that's becoming more water efficient with assistance from SCS and ASCS belongs to Dave and Tom Cassinelli, who grow alfalfa for their cow calf operation at the foot of the Santa Rosa Mountain Range near Winnemucca. Tom Cassinelli is chairman of the Paradise Valley Conservation District board. Dave is on the Humboldt County ASCS committee.

The Cassinellis began upgrading the irrigation system on their farm when they took it over in 1970. SCS provided them technical assistance in leveling 75 acres and installing a border irrigation system that's supplied by snowmelt. ASCS provided cost sharing on installing the pipelines. A pivot system provides supplemental irrigation. The Cassinellis are using center pivot irrigation on another 135 acres of alfalfa, and SCS staff from the Winnemucca field office are evaluating its efficiency.

"Water is king," said Dave Cassinelli. "Around here, if you don't have water, you don't have anything. USDA targeting efforts are good because water is short, and we can't afford to keep using it at 50-percent efficiency."

Frosty Tipton, a board member of the Sonoma Conservation District in Humboldt County, requested SCS assistance in laser leveling 122 acres of rented land and installing a border irrigation system before he began production. "I wanted to start out right," said Tipton.

The system has 64 borders and uses buried pipe and risers. Tipton irrigates one

SCS conservationists Terry Berogan, left, and Christian Pacheco read and record the amount of irrigation water collected in rain gauges after a center-pivot irrigation on an alfalfa field. The farm is at the foot of the Santa Rosa Mountain Range in Humboldt County, Nev.

Photo by Dan Himsworth, public affairs specialist, SCS, Reno, Nev.

border at a time on an 18-day cycle. The system pumps about 1,200 gallons a minute. He grows alfalfa and oats together, harvesting the oats first and then the alfalfa. He uses rye for a cover crop.

SCS used a computer program to figure the border width and length that would work best.

Ditch Lining

The area served by the Truckee-Carson Irrigation District in Churchill County is one of the biggest cropland areas in the State. With an average rainfall of a little over 5 inches a year, cropland operations depend heavily on irrigation.

There are about 73,000 acres of irrigable land with water rights in the irrigation district and about 2,000 water users. Irrigation water comes from the Carson River.

All irrigation in the district is surface irrigation done through a system of canals and ditches. When farmers decide their crops need water, they contact the irrigation district, which puts their request in line with others. The district calls farmers, often in the middle of the night, to tell them when to open their gates.

Many farmers in the area grow alfalfa in rotation with small grains, wheat, barley, and corn in 6- to 8-year rotations. Many younger farmers are moving into row crops—corn, melons, garlic, potatoes, and onions—for higher profits.

Amelio Bell operates his 540-acre Santa Gertrudis Ranch near Fallon. He grows alfalfa for hay and small grain and operates a feedlot.

Over the last 6 years, with SCS technical assistance, Bell has laser leveled a field a year and lined about 5 miles of irrigation ditches with concrete.

Bell estimates that on the finished fields he has reduced the time it takes to irrigate by half. He says that it used to take 36 hours to irrigate 196 acres and now it only takes 18.

Bell says that he is using the same amount of water but instead of irrigating every 21 days, he is irrigating every 12 to 13. He's getting more irrigations, but doing it in less time and at less cost.

Another Churchill County farmer, Ted Workman, irrigates about 85 acres of a variety of row crops. He grows cantaloups, cucumbers, watermelons, pumpkins, squash, sweet corn, tomatoes, peppers, beans, and other food crops. Workman also grows a little hay. He rotates the row crops with alfalfa every 6 or 7 years.

Just about all of Workman's irrigation ditches are concrete lined. "I have to manage every drop of water carefully," said Workman. Vegetable crops are very sensitive to long dry spells. Workman has been experimenting with catching small amounts of subsurface drainage in subsurface lines and reusing it to run sprinklers to supplement his border system.

Managing the Delivery System

In Lyon County, another targeted area, about 80 percent of the water used for irrigation comes from snowmelt from the eastern slopes of the Sierra Nevada Mountains. The snowmelt flows into the Walker River and is delivered to irrigators through a maze of canals and ditches.

In 1949, the Walker River Irrigation District was supplying water to irrigate 50,000 acres and now it's supplying water for close to 80,000. Farmers used to cut two crops of hay and now they're cutting four.

The irrigation delivery system has developed haphazardly over the years. Ditches run parallel to each other for long stretches and cross at many points. As much as 35 percent of water released at the main turnout is lost before it reaches farmers' ditches. Sediment accumulating the river bed and in onfarm ditches is a growing problem.

Lyon County, the Mason Valley Conservation District, and the Walker Riv Irrigation District are sponsoring a Public Law 83–566 small watershed project to help solve these and other problems. SC has approved the East Walker project for planning.

"Current plans include combining five delivery ditches into one and lining it with concrete," said Bill Frade, chairman of th East Walker watershed project steering committee and a member of the Lyon County ASCS committee. "This will cut a 60-mile delivery system almost in half ar reduce many problems with sediment.

"After the main delivery systems have been improved, farmers will be encouraged to improve their onfarm systems," said Frade. "Many farmers ha already begun to improve their onfarm irrigation efficiency by laser-leveling field and lining ditches with concrete."

"We're trying to get a tighter rein on th

Combining parallel irrigation ditches like the ones at right and left of the photo is or way that local sponso of the East Walker River Public Law 83-566 small watershed project in Lyon County, Nev., plan to make irrigatio water use more efficient.

Photo by Dan Himswor
public affairs specialist,
SCS, Reno, Nev.

whole irrigation system," said Vince Dye, a conservation district director on the Mason Valley Conservation District board and chairman of the steering committee for the East and Main Walker river basin study.

SCS District Conservationist John Schelling in Yerington said that SCS is providing technical assistance on the installation of onfarm settling ponds where sediment can settle out of irrigation water before the water is applied to fields. This practice helps keep sediment out of irrigation ditches and preserves the land leveling that was done.

"Irrigation water is supplied on demand," said Schelling, "and most farmers order water from the irrigation district about every 20 days without checking to see how much water is still available in the soil for crops. We're beginning to work with individual farmers on measuring soil moisture to set up an irrigation schedule based on a crop's water needs."

SCS Civil Engineer Roberta Lewis is making an irrigation evaluation on Dye's and other farmers' fields with a neutron probe. Lewis takes moisture readings at various depths before and after irrigation and monitors soil moisture weekly. On Dye's field she monitored three sites on one border in three different soils. This helps to judge the uniformity of water application in the border. The data collected can be applied to other areas of the same soil under similar conditions.

"If farmers can save an irrigation early in the year through proper scheduling," said Schelling, "there might be more water available later in the season, preventing the need to draw on underground supplies."

Since 1981, these conservation-minded farmers and ranchers and many others in Nevada have conserved almost 84,000 acre-feet of irrigation water with SCS and ASCS targeted assistance.

Nancy M. Garlitz,
associate editor, *Soil and Water Conservation News*, SCS, Washington, DC

Pilot Projects Succeed in Land Use Conversion

Converting erodible cropland to pasture or forest land can substantially reduce soil erosion at a low cost to the Federal Government.

In three pilot projects begun in 1983, conservation districts have helped 140 farm operators to convert 14,263 acres of cropland to pasture or forest land. Early results from these projects show an average of 25 tons of soil saved per acre per year at an average cost of $1.16 per ton.

The projects are managed by the governing boards of the local conservation districts in Pike County, Ala.; Bonneville and Bingham Counties, Idaho; and Stanley County, S. Dak. They are funded by the Soil Conservation Service through the Soil and Water Resources Conservation Act of 1977.

Many features of these projects are similar to those now being implemented by the Conservation Reserve Program as part of the Food Security Act of 1985. Farmers participating in the projects received technical assistance, cost-sharing funds, and an incentive payment if they agreed to retire their highly erodible cropland and keep it in a protective cover of grass or trees for a minimum of 10 years.

Unlike the Conservation Reserve Program, the projects did not require competitive bids from the farmers. Each district decided how much it would offer farmers to participate. All of the districts decided on a flat incentive payment equal to approximately half of what it would cost to rent the cropland for 1 year. The total payments ranged from a lump sum of $20 per acre in Alabama to $105 per acre spread over 3 years in South Dakota.

Other costs also varied. Tree planting in Alabama was least costly because little or no land preparation was necessary. Establishment of grass varied with such things as the cost of the seed (native versus tame), land preparation, liming, fertilization, and weed control. In some areas conservation structures were necessary to control gullies. Overall, the average cost for the full 10-year period is projected to be less than $30 per acre per year.

Participants in the projects are mostly owner-operators who make their primary residence on the farm. The farms vary in size and type. In Alabama they range from very small farms to large plantations that produce peanuts, soybeans, livestock, and trees. In Idaho and South Dakota the farms are primarily large cash grain operations.

To be eligible for the conversion projects, cropland had to be in capability classes III through VIII. Each district used its own criteria for determining which of the eligible cropland was most in need of conversion and gave priority to the land most in need. More than 60 percent of the cropland enrolled in the projects had been eroding at more than four times the rate considered the maximum acceptable (T-value).

According to project managers, many farmers found it difficult to commit land for 10 years and cited the current farm economy as the reason. A common concern was that grain prices might increase significantly while they had all or some of their available cropland tied up in grass or timber. Many farmers were also concerned about maintaining the minimum acreage of commodity crops to qualify for USDA price-support programs.

To minimize any loss of income to the participating farmers, the projects placed no restrictions on the use of the converted land provided that the farmers maintain adequate plant cover. As a result, many of the farmers graze livestock and harvest hay on their new grasslands.

SCS personnel developed the contracts and provided technical assistance, but the projects were administered—efficiently and at a low cost—by the districts. This local control enhanced community support for the conversion projects and suggests that local conservation districts can play an important role in the nationwide Conservation Reserve Program.

David Sawyer,
agricultural economist, Appraisal and Program Development Division, SCS, Washington, DC

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Meetings

July	7–11	Izaak Walton League of America, French Lick, Ind.
	27–31	International Symposium on Grass Systematics and Evolution, Washington, DC
	27–31	National Association of County Agricultural Agents, Colorado Springs, Colo.
	27–31	National Federation of Business and Professional Women's Clubs, Milwaukee, Wis.
August	3–6	Soil Conservation Society of America, Winston-Salem, N.C.
	10–14	American Institute of Biological Sciences, Amherst, Mass.
	10–16	International Congress of Ecology, Syracuse, N.Y.
	13–16	American Horticultural Society, San Francisco, Calif.
	17–20	Association of State and Interstate Water Pollution Control Administrators, Superior, Wis.
	24–28	National Farm & Power Equipment Dealers Association, Reno, Nev.
September	11–17	North American Association for Environmental Education Conference, Eugene, Oreg.
	14–16	World Fertilizer Conference, San Francisco, Calif.
	14–18	American Fisheries Society, Providence, R.I.
	22–24	National Water Well Exposition, Kansas City, Mo.
	24–26	National Waterways Conference, New Orleans, La.
	28–30	American Land Resource Association, Washington, DC
October	5–8	Society of American Foresters, Birmingham, Ala.
	5–9	Water Pollution Control Federation, Los Angeles, Calif.
	8–12	National Association of Biology Teachers, Baltimore, Md.
	17–21	Farm and Industrial Equipment Institute, Nashville, Tenn.
	21–24	Natural Areas Conference, Potosi, Mo.
	27–31	American Society of Civil Engineers, Boston, Mass.
November	5–8	North American Lake Management Society, Portland, Oreg.
	9–11	American Society of Farm Managers and Rural Appraisers, Reno, Nev.
	9–11	National Association of State Universities and Land-Grant Colleges, Phoenix, Ariz.
	9–12	National Forest Products Association, New Orleans, La.
	10–13	Geological Society of America, San Antonio, Tex.
	10–16	National Grange, Madison, Wis.
	13–15	Future Farmers of America, Kansas City, Mo.
	30–Dec. 5	American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, New Orleans, La.
December	3–5	Western Forestry Conference, Vancouver, British Columbia, Canada
	3–6	Keep America Beautiful, Washington, DC
	6–10	National Urban Forestry Conference, Orlando, Fla.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986—490-922/40003

7/4

July 1986 Volume 7, Number 4

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013-2890.

Subscriptions
Send subscription orders to:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Comments:
From the SCS Chief

Volunteers—An Invaluable Resource

Last year, almost 700 Soil Conservation Service volunteers did a wide variety of jobs to advance natural resource conservation. This year, SCS is looking to recruit many more highly qualified volunteers to help achieve soil and water conservation goals.

Volunteerism is good for SCS and good for volunteers.

Volunteers enable SCS to reach many more people with its conservation message. Volunteers can help schools with conservation education programs, talk to clubs and organizations, operate displays at fairs and meetings, and make initial contacts with farmers and ranchers.

Volunteers can help SCS technicians do survey and layout work for conservation practices in the field, or do clerical work back in the office. They can help collect data for resource inventories and enter data into computer files. Volunteers can develop public information materials such as slide/tape shows, articles for periodicals, and photographs for many uses. In short, volunteers can provide a wide range of services.

One well-trained volunteer can train many more.

Although they are not paid, SCS volunteers have legal and insurance protection just as any employee. And, volunteers can gain much from their experience.

Both government and private employers consider volunteer work to be qualifying experience for comparable positions. Volunteers often make highly visible contributions to the landscape in their communities, and they always learn more about the places where they live.

When volunteers help teachers work with pupils on outdoor classroom conservation projects, for example, they help give youngsters a head start in learning about resource conservation that will be needed in future years.

Above all, SCS volunteers gain the satisfaction of carrying out some of the most necessary work in this country.

Let's give many more citizens a chance to feel as good as we do about achieving soil and water conservation.

Wilson Scaling

Cover: Concrete-filled fabric and willows protect erosion-threatened lakeshore in Pennsylvania's Pymatuning State Park as part of a demonstration project of the Penn Soil Resource Conservation and Development (RC&D) Area. Articles about this and other RC&D projects begin on page 4. (Photo by Lynn Sandieson, manager, Crawford County Conservation District, Meadville, Pa.)

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

All programs of the U.S. Department of Agriculture are available to everyone without regard to race, color, national origin, sex, age, or handicap.

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New England States Strengthen Volunteer Program

Soil Conservation Service employees from Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island participated in a 2-day workshop in February to learn how to strengthen the volunteer program in their States.

The 30 workshop participants included SCS employees, conservation district employees, and volunteers.

David Mussulman, SCS State conservationist in New Hampshire, hosted the workshop. Judy Johnson, SCS public affairs specialist and liaison to the Soil Conservation Society of America in Ankeny, Iowa, led the training.

The multi-State workshop covered how to develop specific job descriptions for volunteers, how to recruit volunteers, how to supervise volunteers, and how to make the best use of volunteers' donated time and efforts.

"A successful volunteer program requires an accurate assessment of the kinds of jobs volunteers can fill, standard procedures for recruiting volunteers and maintaining records of their time and accomplishments, and recognition for their work," said Johnson. "Volunteers need to feel that they are making a worthwhile contribution."

A long-time SCS volunteer in the New Hampshire State office, Ray Vranicar, a retired U.S. Navy commander, did the local planning for the workshop. SCS presented him with a 3-year length of volunteer service award at the workshop.

All of the States reported good experiences in using volunteers for various jobs in the past, and they recognized the need to recruit more. By April, all six New England States had formed volunteer coordinating committees to help plan and carry out a strong volunteer program.

The State volunteer coordinators report good success with advertising specific volunteer positions in local newspapers and local organizations' newsletters and at colleges and high schools. They are also working with organizations of retired persons.

Since 1982, when the agency's volunteer program began, SCS in New England has recruited volunteers for a wide range of important jobs. Volunteers are monitoring acid rain, making a videotape on proper animal waste management, making a slide/tape show on dry hydrants in farm ponds for rural fire protection, collecting data for agricultural resources inventories, coordinating the development of a recreation area, working with SCS field employees on the design and layout of conservation practices, and coordinating statewide volunteer programs.

Volunteer coordinators in New England say they've just begun.

Iowa Farm Group Volunteers to Help Farmers Sign Up for Conservation

One way a citizen or group can support soil conservation is to ask what can be done locally. That's what Mary Zirkelbach did.

Zirkelbach, 1984 chairwoman of the Farm Bureau Women's Committee in Jones County, Iowa, went to the local field office of the Soil Conservation Service in Anamosa and asked what her organization could do to help. Ronald Williams, SCS district conservationist, welcomed the offer of assistance and suggested that the committee help sign up farmers and others as cooperators with their local soil conservation districts.

Zirkelbach liked the idea and presented it at the annual meeting of District 6 of the Farm Bureau Women's Committee. She won approval to conduct the program in all 11 counties in the district. Committee members in each county then began meeting with various groups to sign up new cooperators.

The goal for each county was 5,000 acres, and this goal was exceeded in six of the counties. In all, committee members signed up the owners of 71,849 acres. The program is being continued this year.

Jody Christiansen,
information intern, SCS, Des Moines, Iowa

Speaking Tips for Volunteers

The number of Soil Conservation Service volunteers is growing steadily. Many SCS volunteers will be speaking on soil and water conservation to school groups, clubs, and other organizations. Here are a few tips that volunteers can use in planning their presentations:

- Cover material that you're familiar with and comfortable in discussing. Consult SCS staff or a knowledgeable volunteer.
- Talk with the teacher or leader of the club or organization ahead of time to discuss what the presentation will include. Discuss equipment needs.
- Anticipate questions that the audience might ask and prepare answers.
- Take postcards to the presentation. If people ask questions that you're unable to answer, ask them to write their address and question on one of the postcards. You can mail them an answer later.
- Practice your presentation in front of a mirror or with friends or family.
- Arrive at the school or meeting room in plenty of time to set up displays and audiovisual equipment.
- Remember, the audience wants to hear what you have to say. That's why they invited you.

Adapted from the April 1986 newsletter for the Agriculture in the Classroom program sponsored by the U.S. Department of Agriculture.

RC&D: The Rest of the Story

Next year will mark 25 years of rural development activities under the Resource Conservation and Development (RC&D) Program. The RC&D Program is an effort by the U.S. Department of Agriculture, under the leadership of the Soil Conservation Service, to improve the economic, social, and environmental life of rural communities through the development and wise use of local resources.

In each area that it serves, the RC&D Program is administered by councils made up of volunteers and representatives from local units of government and other sponsoring agencies. Each RC&D council is assisted by a full-time RC&D coordinator, a USDA employee whose job is to "make things happen" in the area.

In today's economy, a good deal of attention is paid to projects that encourage investments, develop new industries, expand markets, and create jobs. Just as important to most RC&D councils, however, are those projects that produce safe drinking water, community centers, clean rivers, protected wetlands, abundant wildlife, and other community assets that are impossible to put a price tag on as far as dollar benefits are concerned. In all cases, the RC&D council itself—and not the Federal Government—decides what needs to be done in the local communities.

This is the second part of a two-part series of articles about RC&D projects that are "making things happen" across the Nation. The first part dealt with economic development, those projects that generate more dollars for rural economies. The articles in this part focus on the rest of the story: projects to improve the quality of life and conserve natural resources.

Ron Page,
national RC&D coordinator, SCS, Washington, DC

Improving the Quality of Life

Town Is Mindful of Future Water Needs

Residents of rural Charlestown, R.I., use individual wells to pump their water from beneath the ground. Their water supply may be out of sight, but it is not out of mind.

After Charlestown's population almost doubled over the past decade, town officials became concerned about the continued availability of adequate water supplies and protecting the ground water resource. They asked the Rhode Island RC&D Area Executive Council and the Southern Rhode Island Conservation District for an Environmental Review Team (ERT) evaluation of the town's ground water resources.

The ERT is a group of environmental professionals drawn together and coordinated by the RC&D council. It is made up of private consultants and specialists from universities and a variety of Federal, State, and regional agencies. Team members vary according to the nature of the review and are generally not available on municipal staffs. ERT evaluations are conducted to provide environmental information and analyses of sites for proposed land uses to assist town officials and developers in their decisionmaking.

In response to Charlestown's request, the RC&D area organized an ERT consisting of geologists, biologists, community planners, engineers, hydrologists, and other professionals. Agencies represented included the Rhode Island Department of Environmental Management, Rhode Island Water Resources Board, Rhode Island Office of State Planning, U.S. Geological Survey, and SCS.

A great deal of information about the area's ground water resources was already available but was scattered in several different publications. From these sources and reports by individual team members, the ERT determined that ground water supplies within Charlestown were indeed limited. But they also determined that there are adequate water supplies for the entire region available in adjacent towns.

The ERT report made specific and general suggestions on how the town could prevent ground water contamination. It also gave guidance on ways to work with neighboring communities to protect the region's ground water resources.

"With a few exceptions, ground water quality in the area is very good," said Matthew Puchalski, a Charlestown Town Council member and retired soil scientist. "But the nature of the soils in the area makes the ground water very susceptible to contamination. Now is the time for us and our neighboring towns to take actions to protect our water resources for the future. The ERT report is helping us do that."

Philip J. Morneault,
public affairs specialist, SCS, Storrs, Conn.

Financing a Rural Water Project

Rural water projects are not new for southern Iowa. What is new is the way the people of Jefferson County financed theirs.

Attempts were made several years ago to finance a rural water supply for the Jefferson County area, but they met with failure. The people were statistically too rich to qualify for Federal grants and subsidized loans but too poor to finance the project at conventional mortgage rates.

This time, however, the organizers tried a new approach. They asked the Pathfinders RC&D Council for help and were able to finance the project in a way that saved money, provided more flexibility of payments, and preserved local control.

Working together, the Jefferson County Rural Water Steering Committee and the RC&D council looked at what had been done in adjacent States. They discovered that a rural water group can organize as a legal entity under a little-known and seldom-used section of the Iowa Code.

The water users then organized as a legal entity, constructed the project, and sold 10-year revenue bonds at local banks at about 3 percent below conventional interest rates. They also saved on finance charges during construction of the project, before the bonds were sold. As a legal entity, their water district qualified for interim bank financing at a reduced interest rate as regulated by the State for municipal construction projects.

Financing through USDA's Farmers Home Administration for a period of 40 years, a common method of funding such projects, would have resulted in a total end cost about four times the initial construction cost. By selling bonds, the total cost will be less than twice the construction cost.

Dale Kraus,
RC&D coordinator, SCS, Fairfield, Iowa

Good Grounds for a Better Community Center

Highway 12 sweeps out of Camden, S.C., and cuts smoothly across the rolling midsection of the State and the Santee-Wateree RC&D Area. About 5 miles from town is the tiny community of St. Matthews—a scattering of homes around what was once the community's school.

The St. Matthews School filled the educational needs of the community for many years until it was closed in the 1950's and the children sent to a new area school. The county education department then donated the building and grounds for use as the St. Matthews Community Center. For more than 20 years now it has provided a place where area children could go for supervised recreation.

According to Simon Engram, Jr., a postal worker who is volunteer president of the community center, time has been hard on the old school. "Over time everything had just deteriorated. The building was in bad shape and the grounds were in worse," he said. "There was no topsoil, no grass, and every time we had a rain, mud would wash down to the front door."

Erosion was so bad that several of the center's activities were suspended, and many people stopped coming. By June of 1984, Engram knew something had to be done. "Our goal has always been self-sufficiency and we have never received any type of outside funding, but on this I knew we needed some professional help," he said.

Engram asked the Kershaw Soil and Water Conservation District for assistance, and it was there he learned about the RC&D Program. Fred McLaughlin, RC&D coordinator, and Wilfred Pace, SCS soil conservationist, worked with Engram to develop a project proposal.

Pace investigated the site and designed a plan to control erosion, revegetate the 2-acre grounds, and safely remove and dispose of excess water. The project would cost $3,700, but 80 percent of it could be funded with RC&D funds through the Santee-Wateree RC&D Area.

"The RC&D Program made it easy," Engram said. "Through SCS we received a good plan—everything was laid out. We knew what had to be done and when it had to be done. Now it was up to us to come up with our share of the funds."

During the winter of 1984, members of the community center held bake sales, dances for young people, and solicited pledges from neighbors to raise money. By spring everything was ready to begin.

A contractor was called in to do the heavy shaping and grading for a 1,000-foot diversion. From then on most of the work was donated by cooperating organizations and community volunteers.

The State highway department delivered 26 dumptruck loads of topsoil to the center and installed 40 feet of culvert pipe. The county Extension agent drew up a landscaping plan. A local farmer brought his tractor to spread the topsoil, and 30 volunteers went to work seeding and fertilizing the grounds. A local racetrack donated mulch.

Today, the grounds of the St. Matthews Community Center are completely protected from erosion. The once-barren land is covered with grass and trees, and kids play on a softball field where there used to be a gully.

Even Pace is amazed at the results. "I guess when a group of people get together and make up their minds to do something, anything is possible," he said. "It shows you what a little bit of money and a lot of hard work can do."

Engram agreed. "This RC&D project has been like a shot in the arm for us," he said. "And this is only the beginning. There are so many things we want to do, so many ideas, but we know we have to take it one step at a time. Our next project will be to refurbish the building itself."

David White,
public affairs specialist, SCS, Columbia, S.C.

Simon Engram, Jr., left, president of the St. Matthews Community Center, and SCS Soil Conservationist Wilfred Pace study plans for rehabilitating the community center near Camden, S.C. The center's grounds were reclaimed through a project of the Santee-Wateree RC&D Area.

Study Steers River Use

The Saco River originates in New Hampshire and flows through Maine to the Atlantic Ocean, a distance of 125 miles. Possibly the most popular river for smooth water canoe touring in New England, the Saco sustained more than 90,000 user-days in a recent season.

The river serves as a water supply for the cities of Biddeford and Saco, Maine. As recreational use of the river has grown in recent years, there has been an increase in riverfront trash and litter.

In response to requests from the States of Maine and New Hampshire, the Threshold to Maine (Maine) and North Country (New Hampshire) RC&D Councils, the Saco River Corridor Commission, local planning groups, involved soil and water conservation districts, and other interested persons formed a bi-State Steering Committee to look at the problems on the river and plan for future use.

The plan was completed in 1984 and recommendations activated almost immediately. An advisory committee was formed of local landowners (some of whom own riverfront property), representatives of canoe livery and campground owners, a volunteer from the Appalachian Mountain Club, and a representative from each of the two RC&D areas.

A river "runner" has been hired to assist canoeists on the river from Memorial Day through the Labor Day weekend—the season of heaviest use. The uniformed runner has no police powers but does provide an official presence on the river. The runner shows canoeists how to handle waste and trash, gives directions to local facilities, warns of hazards on the river, and conducts a general educational program.

The majority of the river frontage is owned by local people who allow canoeists to camp, put in their canoes, and take them out again. The landowners report a greater sense of security now that there is a committee to whom they can direct their questions and suggestions and who will act in their behalf.

Maine is using the study to determine the best locations for new campground facilities. The State has been very supportive of the advisory committee, sending representatives to meetings and offering assistance. The two RC&D councils are monitoring the progress and expect to offer further assistance as the advisory committee develops its programs.

William J. Branigan,
RC&D coordinator, SCS, Westbrook, Maine

Citizens in Maine and New Hampshire are concerned about future use of the Saco River, possibly the most popular river in New England for smooth water canoe touring.

Preserving Woodland Eases Flooding Problem

Balancing the needs of the environment against those of people sometimes causes conflict—especially when drainage is involved. But an innovative project of the Crossroads of History RC&D Council in South Carolina benefited both.

The small town of Eastover in Richland County had been experiencing increasingly severe drainage problems. "The town's old drainage system was obstructed by trees garbage, and silt," said Tom Boney, Richland County official and RC&D councilman. "Many yards were flooded for up to 6 months out of the year." The town was facing health problems from mosquitoes and inadequate sewage disposal.

To remedy the situation, the RC&D council, Richland County, the Richland Soil and Water Conservation District, and the South Carolina Land Resources Commission worked through the Governor's office to secure $300,000 in Community Development Block Grants. The county administered the contract, and SCS provided technical assistance.

"Basically, we were just cleaning out and expanding the old system," said SCS District Conservationist Jim Wilson.

A part of the expanded system called for a drainage ditch to be constructed through 8 acres of woodland that is wet during part of the year. If the project went through as planned, however, this habitat for many wildlife species would have been significantly altered.

"We had the easements to construct through the area," said Gene Dobbins, SCS engineer. "But we didn't want to because we wanted to preserve the natural woodland area."

"We determined the wetland area was large enough, and had enough natural flow, that we could end the drainage ditch above it," Wilson said. "At the other end we picked up with the ditch and finished the project as planned."

Not disturbing the wetland area and yet still being able to complete the project won high marks from local residents. "This RC&D program has been very valuable to the people in the Eastover area," said

Allen Dowdy, who farms near Eastover. "It has improved living standards and made Eastover a cleaner and healthier place to live."

David White,
public affairs specialist, SCS, Columbia, S.C.

Prisoners Put Farmland Back into Production

State prisoners in Maine are getting fresh vegetables after learning how to garden.

Several years ago the Time and Tide RC&D Agricultural Resource Committee became concerned about several hundred acres of idle State-owned farmland. This land had previously been farmed to provide food for inmates at the Maine State Prison at Thomaston. Since 1977, however, all of the food used at the prison had been purchased.

Led by the RC&D's Agricultural Resource Committee and Human Needs Committee, a number of agencies and individuals formed a nonprofit group called the Mid-Coast Agricultural Resource Center (MARC). This group began to work with elected officials and prison administrators to put the farmland back to work. Eventually, a project supervisor was hired through the local Manpower Council.

Workshops were held to teach the inmates how to garden. The first year about an acre was planted in gardens. The next year MARC located seeds for potatoes and other crops and old equipment at little or no cost. Hay was cut, baled, and sold, and the proceeds were used to buy better equipment.

More crops have been grown each year until, in 1985, the State Legislature provided funds for more equipment and about 45 acres were planted. The farmland now provides almost a year's supply of potatoes for the more than 400 prisoners, and the prison trades surplus squash to a processing plant for canned goods. This program has benefited inmates who want to learn about farming, and in 1985 it saved the State $35,000 on food.

Norris D. Braley,
RC&D coordinator, SCS, Waldoboro, Maine

Conserving Natural Resources

Fresh Start at Old Problem

The Copper Basin lies in the lower Appalachians and encompasses about 60,000 acres of hills and valleys in Tennessee, Georgia, and North Carolina. For most of the past century much of the basin has been largely devoid of plant life.

In the early 1800's, exploration for minerals, primarily gold, began. During the mid-1800's, mining for copper began and, since transportation of crude ore was expensive, smelting of ore in the basin developed rapidly. This process demanded large amounts of wood for fuel and produced large amounts of sulfur dioxide.

By 1900, virtually all timber within hauling distance had been cut and all vegetation in the vicinity of the smelters had been destroyed by sulfur dioxide. High smokestacks spread the fumes in the early 1900's and, eventually, a 50-square-mile area was largely denuded and subject to erosion.

The basin is drained in Georgia by the Toccoa River—called the Ocoee in Tennessee. Millions of tons of topsoil from the area now lie in the river, three downstream lakes, and the Gulf of Mexico. Below the basin, the U.S. Tennessee Valley Authority (TVA) maintains three power-generating facilities on the Ocoee. Each has been damaged by sediment, with one reservoir having lost about 90 percent of its water storage capacity. Damage to turbine equipment has also been high. Sedimentation and concentrations of heavy metals, partially contributed by runoff from the soils high in minerals, caused this section of the river to be devoid of fish and aquatic life.

Reclamation efforts in the basin first began in the 1930's, and have been attempted by a variety of groups and organizations over the years. Most of the revegetated areas have been planted by mining companies. Early on, the Civilian Conservation Corps was involved. Other efforts have involved TVA and USDA's Forest Service. Some of the early efforts achieved a degree of success through sheer persistence, with some areas planted three times before tree stands were established. The denuded area has been reduced to 8,600 acres.

Because only a few hundred of the affected acres are in Georgia, relatively little reclamation work has been attempted there. Soil loss is significant, though, because slopes range from 25 to 60 percent and as much as 200 tons of soil per acre erodes away each year. Much of this land is located close to the river, and eroded soil quickly becomes sediment.

The Limestone Valley RC&D Council recognized this problem and encouraged reclamation efforts. The Fannin County, Ga., Board of Education shared the council's concern and expressed interest in treating their eroding school grounds. As a result, RC&D Coordinator W.C. James, Jr., began working on a plan in 1981 to revegetate a 28-acre tract adjacent to McCaysville Elementary School. As the plan developed, the Blue Ridge Mountain Soil and Water Conservation District joined in.

The tract was almost totally unprotected, with only a few scattered, stunted trees and shrubs. Several deep gullies were present. The soils are low in fertility and highly acidic with heavy concentrations of aluminum. Virtually no topsoil was left and small rocks were common on the surface.

Recent research by the Forest Service had indicated that increased survival and growth rates of pine seedlings could be achieved by breaking up the soil to a depth of 2 feet or more (subsoiling) and placing fertilizer pellets in the soil near each tree. Other alternatives, such as shaping and seeding to grasses, in addition to tree planting, could have led to more rapid erosion control but were prohibitively expensive.

By late summer of 1982, contour subsoiling was underway under the supervision of SCS Technician George Daves and District Conservationist Jimmy Taff. Plans called for the area to be ripped or subsoiled on 4-foot centers, 3 feet deep. In early 1983, after the subsoiled earth had been given time to settle, a five-man crew handplanted improved loblolly pine seedlings 4 feet apart in each rip. As the seedlings were planted, a fertilizer pellet was placed in dibble holes next to each tree. The root systems of the planting stock had been treated with a water-holding gel that helped the tender root systems withstand an extended dry period that occurred during their first growing season.

Early in the spring of 1984, six sample plots were established at random over the 28 acres. The average tree height was slightly over 18 inches, the average diameter at the base was almost 5/8 inch, and the survival rate 92 percent.

One year later, when the trees were remeasured, the height averaged 30 inches, an increase of 66 percent. The average diameter had increased to about 3/4 inch, an increase of about 20 percent. The survival rate dropped to 88 percent, but this is still higher than is often found on good sites. For the first time there are significant amounts of natural grasses and herbaceous material on the site. Forest litter is also beginning to build, and it is estimated that canopy cover is approaching 35 percent of the area.

The success of this treatment has led to plans for reclaiming the remaining Georgia portion of the basin and other critical areas across the State. Where practical, areas will be seeded with grass-legume mixes to provide quicker erosion control, but the basic long-term treatment for such areas in the future will likely combine fertilization, subsoiling, and tree planting.

Gary L. Tyre,
State forester, SCS, Athens, Ga.

Ronald G. Barton,
RC&D coordinator, SCS, Gainesville, Ga.

Birds, Bees, and Other Wildlife

Rural Indiana has undergone dramatic changes over the past 50 years that have had a direct effect on wildlife populations. Once, small farms with small fields cloaked in mixed grains, pasture, hay, and woodlands created a patchwork of ideal wildlife habitat. Today, fields of corn and soybeans often stretch from road to country road, and huge irrigation systems crawl across the sand ridges. The wildlife that remains is confined to idle State lands, river bottoms, drainage ditches, and a few isolated woodlots.

Perhaps no animal better represents the plight of wildlife in rural Indiana than the eastern bluebird—a summer visitor considered by many to be a traditional sign of happiness. The bluebird had the misfortune of a lifestyle directly intertwined with the wooden fencepost. Once, there were millions of wooden fenceposts that provided enough suitable nesting cavities to make bluebirds a common sight, flitting about the countryside eating insects. Today, the fenceposts are steel, corn and soybeans grow where cattle grazed, and bluebirds are scarce.

In an effort to attract bluebirds back to northwestern Indiana, the residents of Pulaski County last year began building and erecting nesting boxes. This effort was coordinated by the Wildlife Committee of the Arrow Head Country Resource Conservation and Development (RC&D) Area.

The Winamac Conservation Club, the Winamac Post of the Veterans of Foreign Wars, and the Indiana Department of Natural Resources donated money to buy enough western redcedar lumber to build 500 bluebird houses. A total of 30 volunteers then offered to serve as carpenters, and sawdust soon began to accumulate in their basements, garages, and home workshops.

Locating sites and erecting the houses near suitable bluebird habitat was the next major hurdle. In a short letter to the trustees of all 12 townships in the county, the committee offered 40 bluebird boxes to each township. It asked for—and received—their assistance in locating suitable sites, cooperative landowners, and youth groups or neighborhood children to install the boxes. Hundreds of people turned out to help, and by April 1985 all of the boxes had been erected.

Another of the many wildlife projects of the RC&D Area, which encompasses Kosciusko, Marshall, Fulton, White, Pulaski, Starke, Jasper, and Newton Counties, is an annual beekeeping clinic. More than 50 beekeepers attended the first clinic in 1984. A wildlife biologist who manages several hives discussed bee biology, the value of pollinators, the pollination process, honey production, chemical hazards, and the construction of hive boxes. A beekeeper from Francesville opened an active hive, pointed out the queen bee, and discussed equipment, swarming, and honey marketing. Interest was so great that the committee immediately began planning a second clinic, and a third is scheduled for this year.

According to Ray Haschel, committee chairman, many of those who attended the clinics were hobbyists who have since gone on to become commercial honey producers. "To measure the success of any clinic," said Haschel, who is a soil conservation technician with the Winamac SCS field office, "count the number of people it spurs to action."

At least six people who attended an RC&D pond tour took immediate steps to renovate their ponds. The tour featured a State fishery biologist who demonstrated how to eradicate all the fish from a farm pond and explained why total fish removal and restocking is necessary to turn a pond into a productive fishery. He also demonstrated the use of a "shocker" boat that temporarily immobilizes fish by electric shock so that they can be examined to determine growth rates and the ratio of species. In addition to providing recreation, a well-managed pond and the adjacent habitat benefit hundreds of wild animals.

Many residents of rural northwestern Indiana depend on trapping for income. According to Haschel, a good ditch or marsh can yield $30 to $100 an acre in muskrat, mink, or racoon pelts. Removing muskrats can also add several maintenance-free years to the life of a pond or ditch and reduce downstream sediment.

About 100 people attended a trapping clinic sponsored by the Wildlife Committee at the Jasper-Pulaski Fish and Wildlife Area. The clinic stressed the legal and ethical responsibilities of trappers. Subsequent clinics will feature more hands-on demonstrations and contests.

The committee prepares a semiweekly newspaper column—complete with cartoon illustration—entitled "Creature Features." Although these 250-word features are geared for young people, careful research ensures that the information about wildlife is accurate and reliable.

The committee plans to sponsor a natural resources field day for the estimated 400 children enrolled in 4–H wildlife, forestry, and soil conservation projects in the area. Another project in the planning stage is the preparation of a natural resources instructional packet for school teachers in the area.

Wayne Machan,
program specialist, public affairs unit, Division of Fish and Wildlife, Indiana Department of Natural Resources, Indianapolis, Ind.

Adapted with permission from an article in the July/August 1985 issue of *Outdoor Indiana*.

Park Visitors See Conservation in Action

An RC&D measure in Crawford County, Pa., is protecting an endangered peninsula and showing land users how to control shore erosion.

A peninsula of Pymatuning State Park juts into the 14,500-acre Lake Pymatuning on the Pennsylvania-Ohio State line. The park attracts as many as 90,000 visitors a day, and thousands enjoy hiking and fishing on the peninsula itself.

Back in the 1970's the park's peninsula was eroding at a rate of 10 to 15 feet annually and faced total obliteration within 10 years. Something had to be done to protect the many popular hiking, picnicking, and fishing spots in Pymatuning State Park. Help was sought from the Penn Soil RC&D Area.

The State park superintendent, the SCS district conservationist, and the RC&D coordinator planned a course of action. They decided not only to treat the critical erosion problems on the peninsula but also to create a demonstration area to show visitors the various methods available for protecting the rest of the lake's 70 miles of shoreline. A single storm can sometimes remove 20 feet of land.

Starting in January 1980, a variety of erosion-control methods were installed. Sections of the shoreline were protected with large rock, concrete-filled fabric, rock-filled gabion baskets, aluminum sheet pilings, and willow plantings.

"All methods have worked effectively," said Carl Pelino, SCS district conservationist. "The shore recession has been stopped, and the peninsula will be protected indefinitely."

Fishermen find the demonstration area offers good spots for shore fishing. More important to SCS, however, is its value for demonstrating to park visitors—whether or not they own waterfront property—alternative methods for long-term erosion control.

Frederick E. Bubb,
public affairs specialist, SCS, Harrisburg, Pa.

Shop Students Build Nesting Boxes

Wood ducks in Piedmont North Carolina once nested in cavities made by ivory-billed and pileated woodpeckers in large dead trees. But the ivory-billed woodpecker is now nearly extinct, and today's farming and forestry practices keep forests from becoming overmature and littered with dead trees. As a result, the cavities suitable for nesting have become scarce and so have the wood ducks.

To increase the population of wood ducks, the Wildlife Committee of the North Central Piedmont RC&D decided to provide suitable nesting structures. The committee wanted to build wood duck nesting boxes that are easy to erect, long lasting, and affordable. After studying various types of wood duck boxes and construction plans, the committee decided to make the boxes out of cypress.

The vocational agriculture department at Western Alamance High School joined the project. The students now work in the shop for 2 to 3 weeks each year to make the boxes. During this time, they learn to grade, measure, and cut the wood with simple shop tools and power tools.

The shop project operates like an assembly line, with students advancing from one stage to another until all parts have been cut out. They then assemble the cypress pieces using galvanized nails and following specified procedures.

The Wildlife Committee furnishes all the materials for the project and sells the boxes. Thus far more than 2,860 wood duck boxes have been produced, and the students themselves have installed 125 boxes in three watersheds. These boxes should help replace the only missing element of wood duck habitat in the Piedmont, the cavities in large dead trees.

J.W. Busick,
chairman, Wildlife Committee, North Central Piedmont RC&D Area, Gibsonville, N.C.

News Briefs

Surge Irrigation Guide to be Published

The Soil Conservation Service will soon issue a new guide for assisting farmers with surge irrigation, a relatively new way of flood-irrigating furrowed cropland.

The new guide will supplement the general irrigation guide available to SCS field offices. It is designed to help landowners decide if surge irrigation is appropriate for their operations and, if it is, how it should be managed.

Surge irrigation works by the use of special valves that send surges of water down the furrows at specified intervals. On many soils, water can be more evenly distributed by surges than by a steady flow. With steady-flow systems there is a tendency for more water to saturate into the soil at the upper end of the furrows, where it is applied, and for less water to reach the lower end.

The advantages of surge irrigation can include savings of water, energy, and fertilizer. If properly designed and managed, it can reduce water pollution. The disadvantages include the cost of the equipment and the higher level of management required.

Some form of furrow irrigation is used on 70 percent of the land irrigated in the United States. Most of the requests SCS receives for assistance with surge irrigation come from farmers in Texas, Oklahoma, Kansas, Nebraska, and Colorado.

SCS engineers and soil scientists developed the new guide with assistance from scientists from USDA's Agricultural Research Service, university researchers, water district specialists, consultants, and surge equipment manufacturers. In conjunction with the new guide, SCS has issued a brochure, "Surge Irrigation," that provides general information about the practice.

Swayne F. Scott,
national irrigation engineer, SCS, Washington, DC

TVA Launches Journal

The Tennessee Valley Authority has announced publication of a new journal, *Forum for Applied Research and Public Policy.* According to the editor, Alanson Van Fleet, it is being published "to help focus attention and stimulate discussion on policy issues related to energy, economic development, and the wise use of natural resources. "The journal will carry articles on policy-related research from the Nation's universities, research centers, private companies, and public offices," Van Fleet said. "Manuscripts will be reviewed by an independent panel prior to acceptance for publication."

The first issue of the quarterly journal carries an exchange of articles on soil erosion. Donald Worster, author of *Dust Bowl: The Southern Plains in the 1930's* and chairman of the graduate program in American history at Brandeis University, opens the exchange "by exploring the root causes of America's inability to overcome its soil erosion problems."

According to the editor's introduction, "Mr. Worster contends the Nation's market-oriented economy has devalued our sense of the soil's life-giving properties, and has caused us to abuse this vital resource. He argues that the Soil Conservation Service, created in response to the economic and resource crises of the Great Depression, soon became entrapped by the value system that was responsible for soil erosion problems in the first place. As a result, SCS officials began to offer technological solutions to political and cultural problems."

A response to Worster is offered by Norm Berg, former SCS Chief and a senior advisor with the American Farmland Trust. According to the editor, Berg argues that "contrary to Mr. Worster's contention, the SCS has done an admirable job, and points with pride to the agency's environmental record. Second, he contends that public institutions, if they are to be effective, must work within the political boundaries set by a society's enduring principles, and in our case those principles are the individual pursuit of wealth and the sanctity of private property."

Another environmental issue covered in this first issue of *Forum* is that of ground water. The articles in this section are:

- Ground Water Policy: A Need for Federal Participation by David Durenberger.
- Ground Water Quality: The State of the Tennessee Valley Region by Bevan W. Brown.
- Technological Solutions to the Problem of Leaking Underground Storage Tanks by Austin M. Snow, Jr.
- Underground Storage Tanks: A Note by John S. Crossman.

Subscriptions to the *Forum* are $20 per year. They may be obtained by writing the *Forum for Applied Research and Public Policy,* P.O. Box 1750, Knoxville, Tenn. 37901–1750.

Save-a-Trip, Save Soil

The Iowa Soybean Association has begun a "Save-a-Trip" program to show Iowa soybean farmers how to increase soil protection and decrease production costs at the same time. Through the program, farmers cut out one tillage operation on soybean fields that they are rotating into corn production.

Participating farmers divide a field into two sections. They treat one section as usual. On the other section they cut out at least one tillage operation (saving one trip across the field). Yields will be checked on each plot, and data will be analyzed and published.

"Farmers presently using reduced tillage practices on their soybean stubble are also being encouraged to participate. Even if no comparison plot is available, their experience will provide information for other participants," said Ben Kern, Warren County farmer and president of the association. "We're encouraging people who have already cut some trips out to look for even more soil and fuel savings with no-till or ridge-till."

According to Kern nearly 400 farmers have enrolled in the program since it began in the fall of 1985. By eliminating one major tillage operation, he said, the farmers should save fuel, labor, and equipment costs. The soil conservation benefits include reduced exposure of the soil to wind and water erosion.

Jody Christiansen,
information intern, SCS, Des Moines, Iowa

Miniatures Help with Shelterbelt Planning

Some tiny artificial trees are having a dramatic effect on how farmstead shelterbelts in Minnesota will look in the future. University of Minnesota's Agricultural Experiment Station forest resources researcher Harold "Scotty" Scholten started setting scale-model, artificial trees out in snowstorms in the winter of 1984–85 to measure snowdrift patterns.

"Our results were dramatic. We discovered that we've been putting the shrub row in the wrong location throughout the history of Minnesota shelterbelt plantings," Scholten said. In the past, the shrub row was located on the windward side, adjacent to the outside tree row. This was a major cause of snow damage to inside rows of shelterbelt trees. "We need to improve the design of Minnesota shelterbelts," said Scholten.

"Today, we have fewer farmsteads, woodlands, and fence lines and larger expanses of open fields," Scholten said. "With fewer obstacles to slow down cold winter winds and blowing snow, today's farmsteads are islands in a sea of open fields. That means we need farmstead shelterbelts more than ever before. Farmers who have a shelterbelt say they wouldn't do without it."

Shelterbelts planted in the twenties and thirties have either been removed or have deteriorated so that they no longer provide maximum protection. And "belts" planted in the forties and fifties are in early stages of deterioration. Problems with shelterbelt trees dying are the direct result of planting the trees too closely. And the older the belt, the closer the spacing.

Scholten has been studying snow distribution patterns, snow damage, and degree of deterioration in shelterbelts since 1978. He has also studied species arrangements and spacings to try to determine what shelterbelt design would eliminate snow damage and provide maximum protection and enjoyment for several generations of farm families.

Scholten got the idea of using scale-model shelterbelts of artificial trees for his research from a story about a highway research project on snow fence in Wyoming. "They were using lath to scale and setting them out on a lake to measure snow protection," he said. The day after Christmas, he and his wife went shopping for half-price, miniature artificial trees and shrubs to use in his own research project.

He set the model farmstead shelterbelts (mounted on plywood) out in open fields at the university's Rosemont Agricultural Experiment Station. Ideal wind velocities for his study are about 30 miles per hour. With this wind speed, it takes about 45 minutes for snowdrifts to form a typical pattern. The coldest part of the job? "Lying on your stomach to take pictures of the snow patterns," he answered.

Ohio State Begins Conservation Tillage Program

The Ohio State University (OSU) at Columbus recently began an interdisciplinary program to improve conservation tillage systems. The new program pulls together specialists from OSU's School of Natural Resources and College of Agriculture.

The program began in March under the leadership of Berlie L. Schmidt, who left his position as chairman of the agronomy department to head up the new effort. It is designed to improve crop production efficiency and answer environmental questions about conservation tillage.

Any tillage or planting system that retains at least a 30 percent residue cover on the soil surface after planting will be considered conservation tillage, Schmidt said. This will include such practices as no-till, chisel plowing, and ridge-till.

Schmidt said the different specialists will be working together to improve both farmer profitability and soil and water conservation. "As financially stressed as farmers are right now," he said, "these systems have to be economical and profitable as well as good for the environment."

In addition to OSU faculty members and facilities, the program will rely on the USDA's watershed experiment station in Coshocton County, Ohio. The Coshocton lab, which was established in 1935 in cooperation with the Soil Conservation Service and later transferred to the Agricultural Research Service, will be especially useful to the program, Schmidt said, because of its watershed measurement capabilities.

Natural resource specialists at OSU will study the effects of chemicals and sediment on the environment. Entomologists will be concerned about the potential for more and different kinds of insect problems when more residue is left on the soil. Plant pathologists will study crop diseases. Agronomists will work on developing plants and planting systems that will be efficient and still conserve soil and water. Horticulturists will study the effect of erosion on large-scale vegetable production. Agricultural engineers will work on developing new or improved tillage equipment.

A planning group for the program consists of representatives from the different academic disciplines. Other OSU departments—as well as organizations outside the university—can be brought into the program, Schmidt said, if there is a need for more expertise.

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New Publications

Cost Data for Landscape Construction, 1986

by Kerr Associates, Inc.

The seventh edition of this book has been updated to reflect current costs and methods that can be used for setting budgets, estimating project costs, and evaluating bids for landscape development.

The information in the book is designed for use primarily by designers and cost estimators for preparing cost estimates for competitively bid projects such as parks, subdivisions, office parks, or residential landscapes. Specialized procedures like soil mixing, fertilizing, seeding, sprigging, watering, and other greenscape work items are reported in depth. The planting section contains the results of a national survey of plant materials prices conducted especially for this edition. High, low, and average prices for many species and varieties of trees, shrubs, and ground covers are provided.

Cost Data for Landscape Construction, 1986 is available for $33.50 from Kerr Associates, Inc., 1942 Irving Avenue South, Suite 100, Minneapolis, Minn. 55403.

Anatomy of a Park: The Essentials of Recreation Area Planning and Design

by Donald J. Molnar,
with Albert J. Rutledge

This book is for nondesigners—members of park boards, park directors and supervisors, recreation leaders, and the general public. It explains how to evaluate the esthetic success or failure of park development, describes the functional considerations and demands, and examines the site design process. Emphasis is placed on the monetary factors of park development and design which reflect current financial concerns.

Many drawings and plans are used throughout to clarify and amplify key points. Seven appendixes provide helpful data and information on such aspects as a recreation needs survey, selected game area size standards and layout diagrams, responses of selected trees to recreation use, and responses of selected soil types to recreation use.

This 190-page book is complete with a bibliography and an index.

The second edition of *Anatomy of a Park: The Essentials of Recreation Area Planning and Design* is available for $39.95 from McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, N.Y. 10020.

Planning a Community Center

Prepared by Stuart H. Huntington

Planning a well-designed community center that suits the needs of the citizens is a complex undertaking. This publication provides guidelines on getting organized, including how to attract extensive citizen participation and how to maximize the facility's use and minimize costs.

This 28-page booklet is available for $1.40 from Publications Distribution, Iowa State University, Ames, Iowa 50011.

Erosion and Sediment Control Handbook

by Steven J. Goldman, Katharine Jackson, and Taras A. Burzstynsky

"When land is disturbed for construction, road building, mining, logging, or other activities, the soil erosion rate increases from 2 to 40,000 times. Millions of tons of this soil end up in our rivers, lakes, and reservoirs." These statements are from a comprehensive how-to-do-it guide on how to prevent or greatly reduce erosion by proper planning and by using simple, low-cost control measures. This guide is designed for a variety of readers including engineers, architects, landscape architects, planners, and others responsible for preparing site plans. Review questions and sample problems have been included, so the guide may also be used as a college textbook.

The book is divided into 10 chapters, each describing a major subject area of erosion control. Some of the information covered in these chapters are erosion control problems and causes, strategies for preventing erosion and trapping sediment, specifications for designing and installing control measures, and developing an erosion and sediment control plan for a site. Photographs, illustrations, charts, and tables are used throughout the book for added detail.

This 454-page book is available for $62.50 from McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, N.Y. 10020.

North American Range Plants

by J. Stubbendieck, Stephan L. Hatch, and Kathie J. Hirsch

This book was developed as a primary resource for studying important range plant species. It is especially useful to ecologists, range managers, land managers, college students, and members of range plant identification teams. The selection of the 200 species in this book was based on their abundance, desirability, or noxious properties.

Plant descriptions include characteristics for their identification, a drawing of the plant or enlarged plant parts, and a general distribution map for North America. Each species description includes nomenclature; life span; origin; season of growth; and inflorescence, flower or spikelet, vegetative, and growth characteristics. Forage value is estimated along with brief notes on habitat; livestock losses; and historic, food, and medicinal uses.

In addition to a glossary, this book includes a list of selected synonyms, list of authorities, and list of selected references.

This 465-page book is available for $18.95 from University of Nebraska Press, 901 North 17th, Lincoln, Nebr. 68588.

Encyclopedia of Community Planning and Environmental Management

by Marilyn Spigel Schultz
and Vivian Loeb Kasen

This book lists alphabetically some 2,000 terms used in community planning. The information is presented in short, clear, readable definitions and descriptions. Understanding these terms is essential to understanding the ways in which land is developed, regulated, and protected.

Some of the major subject areas are: land use regulation, transportation, housing, planning techniques and tools, recreation, economic development, federal programs, census applications, and the legal aspects of planning.

This 475-page encyclopedia also contains a list of acronyms and their meanings and over 50 illustrations and diagrams. Extensive cross-references at the ends of definitions guide the reader to related entries.

Professional planners, architects, students, and those who work in related professions will find this a valuable reference.

The encyclopedia is available for $45 from Facts on File, Inc., 460 Park Avenue, South, New York, N.Y. 10016.

U.S. GOVERNMENT PRINTING OFFICE: 1986—490-922/40004

7/5

August 1986 Volume 7, Number 5

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN–0199–9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013–2890.

Subscriptions
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Comments:

From the SCS Chief

Water Supply Forecasting Helps Western Irrigators Save Money and Water

The mountain snowpacks between the Great Plains and the Pacific, truly the West's water reservoir, produce the runoff so vital for the region's economy.

As often happens, this year, some sections got too much water and others, too little. But overall, there's been enough water to meet the demand.

The Soil Conservation Service, as it has for 50 years, continues to play an important part in helping western water users determine how much water will be available each year and how it can be used most efficiently.

The SCS snow survey and water supply forecasting program remains the heart of western water conservation. The seasonal streamflow forecasts that SCS prepares each month from January to June with the National Weather Service are the foundation of most water management decisions. New technology such as the snow telemetry system (SNOTEL) makes the water supply forecasts more helpful to water users.

SNOTEL was the first and is still the world's largest operational meteor-burst communications system. It uses electrons in meteor trails to reflect radio signals daily from more than 500 solar-powered remote mountain data collection sites to master data collection stations in Boise, Idaho, and Ogden, Utah. This information is transmitted by telephone line to a central data storage computer, which also contains information collected in person by SCS snow surveyors and others.

SCS's automated Centralized Forecasting System (CFS) is the latest example of technology applied to water supply forecasts. CFS can put these forecasts into the hands of individual water managers daily.

Any western water user with a computer or a "dumb" terminal and a modem to transmit data by commercial telephone lines can obtain current water supply information through CFS. A simple cooperative agreement with SCS is all that's needed.

As all SCS field offices gain computers under the SCS Field Office Communication and Automation System (FOCAS), a wealth of climate and water supply information from many sources will be available to them through CFS.

SCS western field staffs can put all of this information to good use in working with water users. CFS will allow irrigators to adjust their crop planting strategy and scheduling to save water and money, and reservoir managers, to adjust their operations to help assure a sufficient quantity of water while avoiding harmful, costly downstream flooding.

The Centralized Forecasting System can be a boon to conservation districts and irrigation districts in improving the help that they give to cooperating farmers and ranchers.

Cover: Snowmelt from the Teton Mountains in the background supplies this sprinkler irrigation system in Teton County, Idaho.

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

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SCS Provides Western Water Forecasts on Demand

The Soil Conservation Service's new Centralized Forecasting System (CFS) is a big step forward in making information on western water supply rapidly available to those who need it most.

When CFS was fully implemented this year, it became possible for SCS to put timely water supply forecasts directly in the hands of individual water managers and users daily.

The new system is one of several recent responses to expressed needs from users for more frequent data and improved water forecast services.

For users, the most important service the CFS provides is the delivery of accurate, current information. SCS field offices need timely water supply information for continuing conservation application programs.

CFS is installed at the SCS West National Technical Center (WNTC), Portland, Oreg., on a minicomputer. The system is compatible with the SCS Field Office Communication and Automation System (FOCAS), which will be available in all SCS local offices within 5 years.

CFS was designed to be capable of processing data rapidly, easy to use, and accessible to more than 300 SCS offices in the West and to numerous cooperators.

CFS also stores current and historical hydrometeorological data for the West. Data bases contain monthly data taken from 1,700 snow courses, 600 stream gauges, 300 reservoirs, and 1,200 precipitation stations as well as daily data from 526 snow telemetry system (SNOTEL) sites and 1,000 climatological stations.

Any western water user who has a computer or a "dumb" terminal and a device called a modem can obtain water supply forecasts and data reports through CFS. The modem allows the use of commercial telephone lines to receive and transmit information.

All that an individual, agency, or organization needs to do to use the system is enter into a simple agreement with SCS. SCS already has agreements with more than 100 agencies and individuals to use CFS. Each new user receives an ID—an identifying name that ensures access to the system.

There are no fees for normal use. But a user retrieving an unusually large amount of information at one time will be charged a cost-recovery fee.

The system is "menu-driven," which means that users who are not experts at using computers can use the system easily. A user logs in to the CFS and receives a list of commands on the screen or monitor. The list is like a menu; one needs to make choices from the list.

The commands are either plain English words, like "mail" or "files;" acronyms such as "WSOR," for water supply outlook reports; or mnemonics—memory prodders—such as "update," for daily SNOTEL data.

A user who selects WSOR, for example, will be able to obtain all of the information in the monthly water supply outlook reports except the graphs and maps. Outlook reports are available by the sixth or seventh day of each month from January through June. Selecting the "REP" option under WSOR, for basin reports, gives the user more menu choices. The user can select information for a particular basin and can choose to have the information sent to a computer terminal or a print file.

CFS can be helpful to so many individual water users because it helps accomplish many of the tasks assigned to the SCS Snow Survey Program, such as snow survey data collection, streamflow forecasting, data exchange, and delivery of data and reports.

One CFS program, called STAG, for snow telemetry and ground truth, permits SCS program managers to verify the accuracy of SNOTEL data.

Bernard A. Shafer,
data analysis group leader, Snow Survey Program, West National Technical Center, SCS, Portland, Oreg.

Nadine E. Pitts,
writer-editor, Public Information, SCS, Washington, DC

Many farmers and ranchers in western States use snowmelt to supply their irrigation systems.

Accelerated Land Treatment Benefits Southern Idaho Watershed

Since the first sagebrush met the plow on the fertile Snake River Plain of southern Idaho, farmers have fought an uphill battle to keep their highly erodible silt loam soils in place. The people of Hazelton Butte Watershed, at the center of this rich farming region, gradually are winning the battle against soil erosion by cooperating in one of the Nation's first Public Law 83–566 small watershed projects devoted entirely to land treatment.

Hazelton Butte Watershed covers 14,000 acres in the southeastern corner of Jerome County. Typical of the dozens of cinder cones that rise out of the nearly level plain, the butte has a deep mantle of highly productive loess. This soil supports irrigated row crops, primarily potatoes and sugar beets, plus grains and hay.

The butte has been a good place for people to live and farm for nearly 40 years, but its soil is a fragile resource. On the steeper slopes especially, considerable erosion has been caused by surface irrigation of row crops and by rain and rapid snowmelt.

Without adequate conservation measures, the butte can lose an annual average of 23 tons of topsoil per acre, nearly 300,000 tons in all, and much of that ends up in the Snake River. At this rate, the topsoil would be gone in less than 100 years. Even now, in some fields the soil is so shallow that farm implements hit solid rock or an unproductive calcareous layer only a few inches below the surface.

This erosion affects people other than farmers. When spring storms combine with snowmelt, concentrated flows wash out culverts and roadways and leave deposits of silt on the roads. The cost to the Hillsdale Highway District and the North Side Canal Company to repair this damage has been nearly $70,000 annually.

Concerned with stopping runoff damage, protecting endangered farmlands, and cleaning up streamwater, the North Side Soil Conservation District requested Soil Conservation Service help for the Hazelton Butte. This request, made in 1981, prompted the first small watershed project devoted to land treatment on irrigated cropland. The district's cosponsors for the project were the Hillsdale Highway District and the Hazelton Butte Landowners Association.

On December 1, 1981, the project sponsors and SCS signed a watershed plan to reduce the total erosion yield by about 75 percent, using a combination of enduring management practices. Onfarm planning rapidly followed.

Under the watershed plan, the Federal Government provides cost sharing for the installation of water- and sediment-control systems. These include ponds and basins for the control of water and sediment, grassed waterways, and pipelines for runoff control. Cost sharing is also provided on cross-slope chiseling of fields after the harvest of low-residue crops, and installing sprinkler mainlines and pump structures and concrete ditches or gated pipe for improving surface irrigation systems. The plan also calls for farmers to use conservation cropping systems and tillage methods, as well as irrigation water management and close monitoring of crop residues, which are not cost shared.

To date, 23 watershed contracts, covering 10,660 acres, have been signed. The cooperators have installed more than 23,000 feet of sprinkler mainline, 4,000 feet of gated pipe and concrete ditch, nearly 9,000 feet of pipeline for runoff control, and 4 sediment retention structures. Construction is underway for eight more sediment retention structures and four buried pipelines.

Thanks to this project, 8,000 acres have been fully protected by proper use of crop residue, tillage, and irrigation water management. In 1984, after one of the heaviest snow packs on record, spring runoff caused some damage, but no roads, utility poles, or telephone lines were washed out.

The Hillsdale Highway District has agreed to build up county roadways in critical areas and to build water retention structures where culverts had repeatedly washed out. Because of budget restrictions and other problems, however, some of this work still is not finished.

The sponsors are working hard to get the cooperation of all landowners in the project area, especially those who own critical erosion sites. Larry Huettig, former chairman of the North Side Soil Conservation District, emphasizes the need for complete cooperation. "We needed to start at the top of the butte," Huettig says, "and

Hazelton Butte, in the background, is in southern Idaho. Cross-slope chiseling, or subsoiling, after the harvest of low-residue crops, in the foreground, is one way farmers are holding the highly erodible soil in place.

we haven't. What has been done so far is successful, but we should have started at the top. What SCS has planned would otherwise take care of 90 percent of the problem except for flash floods and snowmelt."

To Huettig, one of the greatest benefits of the program is recognition of the seriousness of soil erosion. "If we want to farm this land 20 or 30 years from now, we need to take care of it today," said Huettig. "Otherwise, it'll be tough for our children and grandchildren to take crops off these farms."

Larry and his three brothers—Keith, Myron, and Gerald—own and operate some 2,400 acres on the butte. They are following the pioneering tradition begun by their father, Herman, who has always used innovative farming methods. Keith feels strongly that new and better tillage management and cropping sequences can help battle erosion.

Richard Murphy, a member of the Hazelton Butte Landowners Association and a cooperator in the project, notes that one of the most cost-effective and successful ways of controlling soil loss has been cross-slope chiseling or subsoiling.

The target date for project completion is 6 years off, but the sponsors agree that progress is already being made. Fighting erosion still is an uphill battle on Hazelton Butte, but victory is getting closer all the time. It's always easier when so many hands join together.

M. Ron Davidson,
district conservationist, SCS, Jerome, Idaho

Travis A. James,
soil conservationist, SCS, Shoshone, Idaho

Coordinated Resource Management Plan Helps Idaho Landowners

In Benewah County, Idaho, a coordinated resource management plan (CRMP) is making it possible for landowners to manage productive cattle and timberland operations on the same land while protecting the soil, water, and other resources.

Rancher Norm Hatley manages 250 head of cattle from June to October on the 45,000-acre Merry Creek area, which comprises the Merry Creek and Middle Fork of the St. Maries River drainage east of Clarkia. The land is primarily in silviculture and logging, but it also supports grasses, forbs, sedges, and shrubs—valuable forage for livestock.

Hatley owns 160 acres in the Merry Creek area and leases the rest from several different landowners. They include four private lumber companies, the U.S. Department of Agriculture's Forest Service (FS), the U.S. Department of the Interior's Bureau of Land Management, the Idaho Department of Lands, and a few private landowners with small holdings.

Five years ago, the forage resource was deteriorating in many parts of the drainage area, especially in riparian areas. Use by livestock and wildlife was reaching as high as 90 percent. There was the potential for cattle to damage seedlings in reforested areas. Something had to be done.

Taking action were Pete Warwick, district forester for the Potlatch Corporation in Bovill, one of the private lumber companies; Carl Mantz, Potlatch range consultant; Don Smith, resource assistant for the St. Maries Ranger District, FS; Larry Cooke, district conservationist, SCS, St. Maries; and representatives of the Benewah Soil and Water Conservation District. They recommended forming a landowners' co-op for attaining better grazing control.

In 1982, the landowners, including Hatley, signed a memorandum of understanding for developing the co-op. The memorandum stipulated that the group would meet each year, before the grazing season, to determine the length of the grazing season, stocking rates, and restricted areas. It also required the group to designate a grazing coordinator. The agreement helped to insure participation by all of the landowners.

Hatley retained exclusive grazing rights within the Merry Creek area. The memorandum stipulated, however, that all leases and permits could be cancelled if he defaulted on any terms, conditions, provisions, or restrictions agreed upon at the annual meeting.

The group added spring and fall field tours to supplement the annual meeting held each January. In the spring they discussed range readiness. In the fall they measured and photographed the vegetation in selected areas that had been protected from grazing and compared the data with grazed areas to determine the percent of forage use.

The tours revealed that the green forage, gentle slopes, and available water in riparian areas attracted the cattle throughout most of the grazing season. Upland areas offered a variety of forage, but the rough topography and dense woodlands made it more difficult for the cattle to reach nutritious plants as they became available.

Maintaining or increasing the stocking rate was not feasible because the areas that had been cleared for timber and planted in seedlings were off limits to grazing until the trees were well established, and forage production on land under a power line that runs the length of the allotment was steadily declining from shrub and tree encroachment. The answer was to improve grazing efficiency.

Salting locations were moved 900 feet from riparian areas to lure cattle to other grazing sites. The average spring turn-out date had been moved back 2 weeks, and release sites were changed.

In 1984, with SCS assistance, the co-op evaluated resource inventory data. The data showed the benefits of management changes made since the co-op formed.

The changes had reduced overall forage use by 10 to 15 percent and led to increased plant vigor. Orchardgrass, tall fescue, and timothy once visible only in the exclosures began to spread outside the exclosures. Most important, potential problems were nipped in the bud.

Based on this information, a 5-year Coordinated Resource Management Plan (CRMP) was developed during the landowners' 1985 fall tour. The CRMP would not have been possible without everyone's cooperation, particularly Norm Hatley's. His positive attitude and willingness to work with the landowners and resource agencies have made the cooperative planning effort a success.

"I had mixed emotions about developing a CRMP starting out, but now I'm quite happy about it," says Hatley. "It gave us a chance to communicate. Once things were organized, it wasn't all that complicated."

Hatley says that this cooperation contrasts with past relationships between landowners and livestock managers. "Historically, some cattlemen allowed land to become overgrazed," said Hatley. "Then regulatory government agencies cut the livestock numbers without regard to the cattlemen's financial commitments. I feel the CRMP group bent over backwards to keep the livestock numbers stable in the area while protecting and improving the resources."

"The CRMP is only the beginning," said SCS's Larry Cooke during last fall's tour. "We need to continue monitoring the resource base and adjust the CRMP where needed. We may not have all the answers, but we'll continue to work toward making the CRMP for the Merry Creek area a success."

Gregory G. Painter,
soil conservationist, SCS, St. Maries, Idaho

North Carolina Farmers Improve Water Management

In eastern North Carolina, Edgecombe County farmer Bellmont Murphrey is a pioneer in a new agricultural practice that is spreading across the Coastal Plain and Tidewater. The practice is controlled drainage, and it could have a big impact on North Carolina's future water supply.

Like past generations of eastern North Carolina farmers, Murphrey needed ditches to keep his crops from drowning in wet weather. But these same ditches were "draining his crops to death" during drought.

Murphrey's solution was to build a control device, or flashboard riser, on his main ditch that would enable him to release water during periods of high rainfall and conserve water at other times. Then he installed a pump on an adjacent stream to refill the ditches during periods of drought. Thus, water can flow from the ditches as well as to them in a process called "reverse drainage" or "subsurface irrigation."

Since he installed his water management system in 1968, Murphrey says it has consistently helped him to produce high corn yields. In 1985 he was the county's corn growing champ in the irrigation class with a 180-bushel average on his 70-acre field. His 1986 crop looked good in June despite weeks of drought in the area.

"As far as we know, Murphrey was the first farmer in North Carolina to use controlled drainage with subirrigation successfully," said Robert Evans, a Cooperative Extension Service biological and agricultural engineer at North Carolina State University (NCSU).

Soil Conservation Service District Conservationist James Wooten, in Edgecombe County, said that SCS has recently helped Murphrey improve the scheduling of irrigations. "We installed six test wells on the field that he subirrigates," said Wooten. "We could determine from them how irrigations were affecting the water table. Corn has different water needs at different growth stages. This testing is enabling us to develop guidelines for making sure that there's not too much water in the soil during germination, but enough during later growth."

Farmers in eastern North Carolina have installed controlled drainage systems on about 30,000 acres, but have combined controlled drainage with subirrigation on only about 3,000 acres. About half of the controlled drainage systems have been installed in the last 18 months, said Evans. They're becoming particularly popular in the Albemarle area. One farmer there has installed 18 flashboard risers to control the water leaving his farm. A controlled drainage system is part of a Public Law 83–566 small watershed project on the Lyon Swamp Watershed in Bladen County.

Both economic and environmental concerns are prompting interest in improved water management, said Evans. It will increase yields, especially on corn, peanut, and vegetable crops. It will reduce agricultural pollutants entering streams, help regulate freshwater intrusion into estuaries, improve wildlife habitat, and help maintain the water table. An NCSU study showed 25 percent fewer nitrates leaving a watershed with controlled drainage.

Combining Practices to Save Soil and Water

Ute Becton is conducting a field trial near Idalou, Tex., to see if good soil conservation practices can reduce the need for irrigation. He is using a combination of wind strips and a wheat/fallow/no-till cotton rotation to reduce wind erosion, conserve moisture, and increase profits.

"So far, it looks as if this system should work without a hitch," said Becton, who is chairman of the board of directors of the Lubbock County Soil and Water Conservation District. "But we will know a lot more about it in another year or two."

With assistance from the Soil Conservation Service, Becton began the trial in 1984 by laying out a field in 80-foot wide strips. Half the strips will be rotated from winter wheat to summer fallow to no-till cotton as the other, alternating strips are rotated from no-till cotton to winter wheat to summer fallow.

In November 1984, he planted every other strip to winter wheat. The next May he planted the other strips to cotton. He can cover the 80-foot strips in three rounds with his eight-row cotton planter.

"The wheat did a fair job of protecting the cotton strips from wind erosion," Becton said. "However, it was planted so late that it didn't have enough height during the winter to give maximum protection. But I saw enough to know that I like the idea of wind strips." He said the strips save one or two trips with a sandfighter.

After harvesting the wheat in the spring of 1985, Becton left the wheat strips fallow with the stubble undisturbed for planting to no-till cotton this year. After harvesting the cotton in 1985, he seeded the cotton strips to wheat in late August with an airplane.

Becton hopes he can grow cotton on the fallowed land this year without plowing, which would dry out the stored soil moisture, and without irrigating. He plans to control plant competition with herbicides.

"We put gypsum blocks in the stubble to monitor stored moisture," Becton said. "The blocks revealed that the soil profile stayed full of moisture all year and it should still be full when I plant cotton next year."

He sprayed herbicides on the wheat stubble in March, then again at planting time. A liquid fertilizer was used when the cotton was planted. If necessary, he will use an 8-row rope wick herbicide applicator while the cotton is growing. He will probably side dress fertilizer one time, then will spot spray one time if needed. If the herbicides do their job, he does not plan to cultivate the cotton.

"Due to high pumping costs and my limited supply of water, I hope this system will allow me to convert to dryland farming," Becton said. "If we have an unusually dry year, I might irrigate one time but I hope that doesn't happen."

As for yields, his goal is to produce 350 to 400 pounds of lint cotton per acre and 20 to 25 bushels of wheat with the dryland system.

Dale D. Allen,
public affairs specialist, SCS, Temple, Tex.

Conservation Practices Help Vineyards Adapt to High Plains

Partly as a result of recent increases in domestic wine consumption, grapes are now being grown some places where they're least expected. For example, grapes are being grown on an estimated 1,000 acres of the dry, windy High Plains of Texas.

One new grape grower in the High Plains is Lynn Harrist. With technical assistance provided by the Soil Conservation Service through the Lubbock County Soil and Water Conservation District, Harrist is establishing a 9-acre vineyard west of Lubbock.

Harrist bench leveled a field for the vineyard in July 1984. The following March he used a whirlwind seeder to plant the berms between the benches to wind strips of 'Ermelo' weeping lovegrass. He planted a windbreak of 'Keteleer' juniper and 'Mondale' pine on the south side of the field, and installed a trickle irrigation system for the trees.

After consulting with the owner of a nearby winery, to whom he hopes to sell his grapes, Harrist planted half the vineyard to red Cabernet sauvignon grapes and half to white Chardonnay. "We planted the vines 6.6 feet apart with a 10-foot row spacing," Harrist said. "That amounts to 660 plants per acre."

The vines were furrow irrigated at planting time. Harrist plans to install a trickle irrigation system in the vineyard by 1987. Hopefully, one irrigation in late April at bud break along with the May and June rainfall, will be sufficient to produce a quality grape crop. The bench-leveled vineyard will make maximum use of rainfall.

When the vineyard gets into full production, in 6 or 7 years, Harrist hopes it will produce 4 to 5 tons of grapes per acre and that the grapes will bring $1,100 to $1,200 per ton. He plans to hire workers to help with the summer harvest and perhaps during the winter pruning season.

Dale D. Allen,
public affairs specialist, SCS, Temple, Tex.

On this bench-leveled vineyard in Lubbock County, Tex., strips of 'Ermelo' weeping lovegrass protect the vineyard from wind erosion.

Management Tips

Readers are invited to submit "Management Tips" to the editor, *Soil and Water Conservation News*, Soil Conservation Service, P.O. Box 2890, Washington, DC 20013—2890.

Lights, Camera, No-Till!

"You can't just grab the video equipment and run out to the field and start shooting," said John Streich, district conservationist for the Soil Conservation Service in Teton County, Mont. "We did that the first time, and we made a lot of mistakes."

Streich is using an increasingly available information tool—the video camera—to make a video tape of local farmers using no-till. The finished tape will be shown at meetings this winter to promote and improve no-till practices in the county.

Teton County is in northwest Montana. It has about 600,000 acres of cropland, mostly in spring wheat, barley, and winter wheat. About 20 percent of the cropland is in some form of conservation tillage. No-till is used on about 3 percent.

This past winter, a group of about 20 no-till farmers who make up the Teton County Conservation Tillage Committee contacted USDA's Cooperative Extension Service and the Teton County Conservation District about the possibility of making an instructional video tape about local no-till practices. They said the tape was needed because most of the no-till information available pertained to corn and soybeans instead of small grain. Field days, they said, were fine but took a lot of time away from farming and tended to concentrate on displays of new equipment that many farmers can't afford.

Members of the committee said they were willing to be videotaped showing how they have adapted their conventional tillage equipment to no-till and how they practice no-till on their farms. They also volunteered to serve on discussion panels to answer questions when the tape is shown to other farmers.

Soon a cooperative effort began to take shape. The Extension office in a neighboring county loaned its video camera. A nearby office of USDA's Forest Service offered its video tape player for showing the tape. Camera duties fell to Streich and local Extension Agent Walt Adams, two men who knew a lot about no-till even if they didn't know much about videotaping.

Taping began during the spring planting season. Committee members called when they were ready to plant, and Streich and Adams drove to the farms with the video camera. They took shots of the equipment and the planting operations and interviewed the farmers about their experience with no-till. They will return during the growing season and harvest to tape other operations and discuss soil moisture, weed control, crop diseases, residue management, yields, soil conservation, and more.

Although the scheduling was made somewhat erratic by a wet spring, Streich and Adams were able to complete the first segment on planting. They soon realized, however, that videotaping is not as easy as it looks.

"We used a handheld camera with a built-in microphone, and that was our first problem. The camera did fine in the light conditions, but we moved it too much from side-to-side and up-and-down. Also, there was too much background noise from the wind and the tractors during the interviews. Next time we'll use a tripod for the camera and conduct the interviews in a shed or behind a building out of the wind."

Wind problems are nothing new to Streich. "The wind blows all the time here," he said. "In fact we have about 100,000 acres of cropland in the county where the wind erosion alone is greater than T (the rate considered to be the maximum acceptable). That's one reason no-till is so important. The stubble holds the soil and traps snow."

The trapped snow increases soil moisture, which is another benefit of no-till because the area receives less than 12 inches of rain a year. "With conventional tillage the farmers have to leave their fields fallow every other year just to build up soil moisture," Streich said. "With no-till they can almost—not quite, but almost—go to continuous cropping."

Such basic concepts, Streich said, are easy to explain. Producing a videotape showing how to successfully practice no-till, he said, is not so easy.

"We'll end up with a good tape, but we've done it the hard way—through trial-and-error. When we get through with all the taping and editing, this will be better than a field day. At a field day you can just show one operation, such as planting if it is held in the spring. With the videotape, we will show the complete process from planting to harvesting and spreading the residue after harvest. We'll be able to show farmers the complete system as performed by their neighbors under local conditions in about 30 minutes.

"This experience really makes me appreciate the skills of a professional camera crew," Streich said. "My advice to anyone else considering this is to get some training—or at least practice—before trying it. It's just like no-till, don't go out there and start doing it unless you know what you're doing."

Paul D. Barker,
associate editor, *Soil and Water Conservation News*, SCS, Washington, DC

SCS Warns of Cave-in Hazards

Soil cave-ins kill about 10 construction workers a year in Texas. Most of these deaths, according to the Soil Conservation Service, could be avoided.

The deaths occur when workers in the building trades, including professional contractors and building inspectors, are buried in pits and excavations by sudden, unexpected landslides. Most deaths occur in trenches dug for plumbing or electrical lines. Many more workers are injured.

Convinced that a little knowledge about soil properties and proper precautions could prevent many of the deaths and injuries, the Texas State office of SCS has begun a campaign to inform the public about the cave-in potential of many of the soils in the State. For most soils, SCS suggests sloping, shoring, bracing, or otherwise supporting the walls of excavations that are deeper than 5 feet.

According to SCS, more Texans are killed by cave-ins of clayey soils than sandy soils. Workers are apparently careful with sandy soils because they know sand is unstable and likely to collapse but take less care around the harder, more compact clayey soils because they mistakenly assume that clayey soils will not slip. But slip they do, and Texas has a lot of clayey soils.

As part of the information campaign, SCS has prepared and distributed to news media a fact sheet, a news release announcing the availability of the fact sheet to the public, and three public service announcements for radio. Since about half of the workers killed each year are Hispanic, these materials will be made available in both English and Spanish.

The campaign, which was started early this year, has thus far generated considerable interest from industrial safety officers, insurance companies, and trade publications. The fact sheet and news release have also been given to mayors, county judges, and contractors across the State.

The fact sheet points out that many clayey soils swell when wet and shrink and crack when dry. This process causes polished and grooved surfaces called slickensides to develop within the soil mass, usually out of sight to the worker. The slickensides are like two pieces of glass pressed against each other. When a ditch or pit is dug into the soil, especially when it is moist, the soil can suddenly slip along the slickensides, causing the walls to cave in.

Slickensides occur most commonly in soils that have a high potential for shrinking and swelling. SCS soil scientists have identified these soils in soil surveys that are available for most counties in Texas.

The fact sheet suggests several different methods for preventing cave-ins. One method is to slope the sides of the cut to the "angle of repose," which is the angle closest to the perpendicular at which the soil will remain at rest. The angle of repose varies with different kinds of soil and should be determined for each project.

SCS suggests shoring and bracing for clays, silts, loams, and nonhomogenous soils. The presence of ground water requires special treatment.

Copies of the fact sheet, "Soil Cave-in—A Fatal Slip," are available from SCS field offices in Texas and the SCS State office, 101 South Main Street, Temple, Tex. 76501-7682.

Dale D. Allen,
public affairs specialist, SCS, Temple, Tex.

Free Seedlings Valued by District

Giving away free pine seedlings can produce conservation results and good public relations at the same time.

For the past 3 years, the LeFlore County Conservation District in eastern Oklahoma has received surplus loblolly pine seedlings from USDA's Forest Service. The district, in turn, has distributed these seedlings free to local landowners.

Most of the seedlings are planted around farmsteads for windbreaks, erosion control, and field borders. They have become so popular that the district has had to set a maximum number that any one individual can receive. This number has ranged from 500 to 2,000, depending on the total number of seedlings that the district receives.

As soon as the district is notified of the number of trees it will receive, it begins a program to inform the public. Newspapers and a radio station help spread the word, and hand-printed bulletins are placed in windows of restaurants, doctors' offices, barbershops, and other businesses.

On the morning of distribution, district and Soil Conservation Service personnel prepare the trees for distribution by removing them from the large bundles, dipping their roots in water, wrapping them in paper towels, and putting them into plastic bags. This keeps the roots moist until they are planted.

The seedlings are given to individuals in bundles of 25, 50, and 100, along with a sheet of information prepared by SCS on proper planting procedures. This year the district gave away 34,000 seedlings to 204 people.

The program gives landowners a chance to appreciate the conservation uses of the fast-growing loblolly pine. It also makes good use of seedlings that would otherwise be thrown away.

Stephen C. Tullar,
woodland conservationist, LeFlore County Conservation District, Poteau, Okla.

Hilda Culver,
district clerk, LeFlore County Conservation District, Poteau, Okla.

Basics Emphasized in Mississippi

Soil conservation is getting back to basics in Rankin County, Miss. The local soil and water conservation district is using personal contacts to educate farmers and landowners on the need to reduce soil erosion.

To inform county residents, businesses, and private organizations of the need for conservation, the district has been sponsoring seminars, tours, and field days. The goal is basic conservation planning.

"One of the biggest drives," said Mark Butler, chairman of the Rankin Soil and Water Conservation District, "is to encourage farmers to contact the soil conservation district office in Brandon for help in developing a personalized conservation plan that will explain the kinds of soil a farmer has and what use is best suited for them."

Butler emphasizes that farmers and landowners who follow conservation plans can save countless dollars and hours of labor by using the soils properly to get the most productivity. The conservation plan is free.

"Approximately $1 billion worth of topsoil is being lost annually in Mississippi because of soil erosion," Butler said. "Too many farmers and landowners have taken for granted that good topsoil will always be there."

The Soil Conservation Service estimates that conservation practices are needed to save the topsoil on 78 percent of Rankin County's cropland. SCS estimates that conservation practices are needed on 55 percent of the county's pasture and hayland and on 43 percent of the forest land.

Conservation plans have been available to the farmers of Rankin County for many years. "And one of our major responsibilities," said Butler, "lies in encouraging the people of our county to take advantage of them. Call it 'back-to-basics' if you like, but it's what we're doing."

Larry Milner,
district conservationist, SCS, Brandon, Miss.

News Briefs

USDA to Join "Take Pride in America" Campaign

The U.S. Department of Agriculture (USDA) is joining a government-wide campaign designed to instill in all Americans a renewed sense of pride and caring for the Nation's land and natural resources.

Called "Take Pride in America," the campaign will encourage citizens to take better care of the land as they use it in living, working, and playing and to participate in volunteer projects to improve or restore neglected or damaged areas.

Said Secretary of Agriculture Richard E. Lyng, "USDA is rich in diversity of people and missions. We have, through our programs, a tremendous outreach capability. We have the means to inspire others to 'Take Pride in America.'"

Lyng has appointed a Department-wide task force to assist all agencies in developing specific action plans. The task force, after meeting with representatives from each agency, expects to have Department and agency action plans ready at the beginning of fiscal year 1987.

SCS and EPA to Coordinate Assistance on Clean Lakes Projects

The Soil Conservation Service and the U.S. Environmental Protection Agency (EPA) signed a formal agreement this spring to foster cooperation at the State level on projects approved under the Clean Lakes Program of Section 314 of the Clean Water Act (Public Law 92–500).

Section 314 authorizes States to identify and set priorities for publicly owned lakes which have become eutrophic or have deteriorated water quality. It authorizes EPA to provide financial and technical assistance to States for controlling nonpoint sources of pollution to these lakes, which are located mostly in agricultural and forested watersheds.

The main intent of the new SCS/EPA agreement is to better coordinate State and Federal efforts on clean lakes projects, especially by setting up a procedure for SCS to provide reimbursable technical assistance through State agencies.

The agreement provides the opportunity for SCS State conservationists to offer reimbursable technical assistance where the priorities of local conservation districts are compatible with those of State agencies seeking clean lake funding.

SCS Cosponsors Regional Meetings on Agricultural Water Quality

The Soil Conservation Service is one of 20 groups sponsoring a series of regional meetings to examine the problems associated with toxic substances in agricultural water.

Four 1½-day meetings are planned on "Toxic Substances in Agricultural Water Supply and Drainage." They are scheduled to begin on July 31 in Fresno, Calif., Aug. 21 in Denver, Colo., Sept. 11 in Washington, DC, and Oct. 23 in Phoenix, Ariz.

Sponsors are the water-related associations, professional societies, and government agencies that make up the United States Committee on Irrigation and Drainage (USCID). USCID is a nonprofit professional society whose members share an interest in the planning, design, construction, operation, and maintenance of irrigation, drainage, and flood-control works; irrigation agriculture and economics; and water law.

"We're seeing a surge of interest in the issue of water quality at the local level," said Swayne Scott, national irrigation engineer for SCS. "We hope to have SCS personnel at each meeting."

A spokesperson for USCID said specialists from a broad spectrum of interests have been invited to present papers. The papers will address legal, social, and environmental issues; government regulatory programs; the effects of toxic substances on humans; and special problems in each region.

In addition to the presentation of papers, the meetings will feature keynote and luncheon speakers, open forums, and panel discussions. Proceedings are to be published and provided to each attendee.

Each meeting will also feature an exhibition of water resources goods and services. Irrigation equipment manufacturers and dealers, agricultural chemical companies, and engineering and consulting firms have been invited to exhibit.

For additional information contact USCID Executive Vice President Larry D. Stephens, P.O. Box 15326, Denver, Colo. 80215.

Women's Association Wins National Conservation Award

The Danvers, Mass., Women's Association received top honors in the 1986 "The World at Your Feet" conservation program of the General Federation of Women's Clubs (GFWC) at the group's annual convention at Cincinnati, Ohio, in June.

The Danvers Women's Association initiated a water conservation program that has resulted in a 5-percent savings in water use in the northeastern Massachusetts community of 30,000 people. The club worked with the Massachusetts Water Authority, local service clubs, the local media, the schools, the Danvers Board of Selectmen, and local businesses in promoting their program.

"The World at Your Feet" is a program for the conservation of natural and cultural resources. It is sponsored jointly by the GFWC and the Soil Conservation Service.

The major goals of the program are to build awareness within individual clubs and in the community of the need for resource management, and then to take action to correct identified problems. Nationwide, women's clubs donated nearly 11,000 hours on 325 projects in the program.

The GFWC is the largest and oldest nondenominational, nonpartisan, international service organization of volunteer women. It represents some 11,000 women's clubs with 500,000 members throughout the Nation. Worldwide, affiliated clubs in 46 countries have 10 million members.

CONSERVATION Research Roundup

Improved Seed Planter

The punch planter, a device used to plant seeds without excessively disturbing the soil, now has a variable rate seeding feature that may make its use more widespread.

In punch planting, uniformly spaced plungers around a wheel penetrate the soil surface. Until now, the inability to change seeding rates limited its use to a few crops or planting situations.

But the new invention replaces the conventional punch wheel with a crank wheel and a pivoting punch column. By adjusting the pivot points of the column and the gear ratio between the crank wheel and a timing wheel the seeding rate can be varied.

The punch planter can be instrumental in reducing soil erosion, because it plants seeds without disturbing residue on the soil surface, which forms a protective cover against wind and rain.

For technical information, contact Maurice R. Gebhardt, U.S. Department of Agriculture, Agricultural Research Service, Building T–12, University of Missouri, Columbia, Mo. 65211.

Reprinted from the May 1986 issue of *Agricultural Research.*

Researchers Study Rate of Straw Decomposition Under Conservation Tillage

Results of a new conservation tillage study could provide an important tool for managing crop residues, according to a U.S. Department of Agriculture Agricultural Research Service (ARS) scientist.

Conservation tillage is a rapidly growing practice in which farmers reduce the amount of cultivation, leaving enough of the previous crop's residue on the surface or in the ground to reduce soil erosion.

"For best crop residue management in conservation tillage, for erosion control, and for efficient fertilizer use, we need to know which straws, among many varieties of small grains, decompose fastest and slowest," said Jay H. Smith, a soil scientist at the ARS Snake River Conservation Research Center in Kimberly, Idaho.

In a 1-year study, Smith and Agricultural Research Technician Ronald Peckenpaugh measured residue decomposition rates of 23 varieties of small grains, including many new cereal varieties.

By the end of the study, said Smith, about half the straws decomposed 65 percent. Hard red wheat and triticale straws decomposed slowest, making them better for staying in the soil and retarding soil erosion than the soft wheat and barley straws.

Burying the straw in warm, moist soil provides the fastest decomposition but the least erosion control, Smith said, adding that farmers can use the decomposition rates in the study to help decrease soil erosion.

Computerized Crop Production System

Scientists at the U.S. Department of Agriculture's Agricultural Research Service National Soil Erosion Lab in West Lafayette, Ind., are working with five State experiment stations—in Iowa, Missouri, Illinois, Indiana, and Ohio—on a computerized crop production system. Their objective is to develop an expert system to help farmers take steps to insure adequate return on their investment, while also conserving and protecting soil and water. Within the next 2 years, the system will be available to Midwestern farmers for use in their personal computers.

For more information contact, Harold Barrows, West Lafayette, Ind. Telephone (317) 494-8673.

Daily Soil Frost Simulation Model

The U.S. Department of Agriculture's Agricultural Research Service reports that soil erosion in the Pacific Northwest caused by runoff on frozen soil or snow can be predicted with a new simulation model. The Daily Soil Frost Simulation Model uses weather data to predict the frozen or unfrozen state of the soil on any given day.

Scientists combine the model with a computer program on weather data in order to define the probabilities of major runoff and soil erosion. The model will help professionals design erosion controls, water conservation, and drainage facilities. Also, freeze-thaw data collected will be used in planning buildings and roadbeds.

For more information contact, John Zuzel, Pendleton, Oreg. Telephone (503) 276-3811.

Night Light Curbs Hydrilla Reproduction

By shining light on hydrilla at night, U.S. Department of Agriculture's Agricultural Research Service researchers may have found the safest and cheapest method yet tried for controlling this extremely fast-growing aquatic weed, according to an article in the March 1986 issue of *Agricultural Research* magazine.

In an experiment site on the Potomac River in Virginia, Lars W.J. Anderson of the Aquatic Weeds Control Laboratory, Davis, Calif., was able to cut hydrilla production by 50 percent, by using night lighting.

"We hit hydrilla when it was vulnerable," Anderson said in describing his experiments of August-September 1985. "Our strategy was to shine overhead lights on these plants at a time when they need uninterrupted stretches of darkness to form reproductive parts." He estimates that a 75- to 95-percent drop in reproduction might be possible; he has already been able to reduce formation of reproductive buds by 95 percent in laboratory tests.

Hydrilla has been reported in more than a dozen States, from Florida to California. If uncontrolled, dense mats of the hardy plant can entangle swimmers or boaters, snag fishing lines, and interfere with irrigation and flood control.

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New Publications

U.S. Agriculture in a Global Economy, 1985 Yearbook of Agriculture

by the U.S. Department of Agriculture

In this 1985 edition of the yearbook of agriculture, experts from a variety of disciplines examine such critical factors as the relationship between domestic policies and international trade policies, the conflict between consumer and farmer interests, and the impact of technology. The 33 articles compare U.S. foreign agricultural trade practices with those of other nations, and examine how domestic farm policies interact with international trade policies here and abroad. However, not all the authors agree about what has happened and what will happen.

Copies of the yearbook are available for $10 from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

The Off-Site Costs of Soil Erosion

Edited by Thomas E. Waddell

In May 1985, a symposium was held to bring together researchers and specialists to better define the state-of-the-art in identifying and quantifying off-site impacts of soil erosion. These proceedings provide substantial new information on the off-site costs of soil erosion and identify many of the difficulties involved in making such estimates.

Much of the information is presented for the first time in these proceedings. For instance, a paper on the economic costs of wind erosion indicates that the damages caused by wind eroded soil may be much more significant than previously thought.

Many of the papers demonstrate how the nature of soil erosion damages varies greatly by geographical area, and some researchers point out that substantial research must be devoted to the issues addressed at the symposium before off-site impacts can be estimated with confidence.

Copies of this 284-page publication are available for $25 (plus $2 shipping and handling) from The Conservation Foundation, 1255 23rd Street, NW., Washington, DC 20037.

Competition for Land in the American South

by Robert G. Healy

The author says that the South's versatile, productive land base offers abundant opportunities for the region to pursue intriguing possibilities in agriculture and forestry. But, he warns, prospects could diminish if serious environmental problems are not addressed and soil and water resources on which sustained use depends are not protected.

Based on a 3-year study, Healy presents data on current land uses: crop agriculture, forestry, animal agriculture, and human settlement. He considers how emerging pressures on the land will affect the natural environment and the visual quality of the rural landscape.

Chapter 1 is an overview of the uses now competing for land within the South; the next four chapters examine, in turn, the current major land uses; chapter 6 analyzes the impacts of competing land uses on soil erosion, water, wildlife habitat, and esthetics; chapter 7 predicts the future uses of land in the South; and the last chapter deals with land policy.

This 334-page book is available for $17.50 (plus $2 shipping and handling) from The Conservation Foundation, 1255 23rd Street, NW., Washington, DC 20037.

Range Economics

by John P. Workman

Caught between a cost/price squeeze and depreciating rangeland values, range managers are being forced to reassess their traditional ways of range management.

This text is intended to be used as a guide by researchers, students, and managers in making economic analyses of range management and improvement practices. The author provides the conceptual framework necessary for a range manager to analyze the consequences of specific management decisions involving the use, development, and preservation of rangelands.

The text begins with an introduction to range economics against a backdrop of the day-to-day workings and problems of western ranch operations. Using numerous examples, the author covers the fundamentals of supply, demand, and price in the competitive market. Next he explores the biological production function in land-use intensity, input-output concepts from a range management viewpoint, and the application of marginal analysis to determine correct grazing intensity. He then expands these concepts to include multiple-input and multiple-use situations. Detailed coverage is given to the crucial concept of time comparison, which underlies all rational decisions about capital borrowing and investments. He concludes with the techniques essential for performing economic analyses of range improvements and an explanation of the alterations necessary in range analysis when undertaken by a public rangeland manager versus a private one.

This 217-page text is available for $34.50 from MacMillan Publishing Company, 866 Third Avenue, New York, N.Y. 10022.

A Citizen's Handbook on Groundwater Protection

by Wendy Gordon

Groundwater is an abundant natural resource of great economic importance to agriculture and industry. About half of all Americans depend on groundwater for drinking, much of it untreated. Recent data show that toxic organic chemicals have contaminated public and private wells in many locations all over the country.

The goal of this handbook is to provide citizens, community groups, and government officials with basic information about groundwater, its contamination, and the regulations and methods being used or considered to protect it.

After an introduction section on the unique nature and uses of groundwater, the handbook describes sections of environmental protection laws that invite active participation by the public. It also includes ways in which the public can initiate the development of groundwater protection strategies and laws. With this information, citizens may be better able to participate in and influence the decisionmaking processes at all levels of government that will affect their groundwater.

The handbook, intended for local government officials and citizens, is available for $7.50 from the Natural Resources Defense Council, Inc., 122 E. 42nd Street, 45th Floor, New York, N.Y. 10168.

Recent Soil Surveys

Published by the Soil Conservation Service

Georgia: Burke County.
Indiana: Rush County.
Kentucky: Montgomery County.
Missouri: Clay and Ray Counties.
Texas: Big Bend National Park and Kerr County.

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7/6

September 1986 Volume 7, Number 6

Soil and Water Conservation News

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Soil Conservation Service

1985 Food Security Act—A Landmark Decision for Conservation

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013-2890.

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Comments:
Guest Editorial

Getting the 1985 Farm Bill on the Land

We're off and running with the 1985 Farm Bill, the Food Security Act of 1985.

For months, retiring highly erodible cropland under the Conservation Reserve Program (CRP) has been the main order of business in many local Soil Conservation Service and conservation district offices. We fell short of our goal of enrolling 5 million acres in the Reserve for the 1986 crop year, but that's partly because farmers took a "wait-and-see" posture on a new program and because CRP is competing against crop deficiency payments. Also, many farmers had already decided on a cropping plan for this year.

Overall, the Department accepted bids from more than 30,000 farmers for almost 4 million acres, mostly for the 1986 crop year. We're still aiming for an additional 10 million acres in the Reserve next year, as well as 40 to 45 million acres overall.

Cooperation among all agencies in the U.S. Department of Agriculture (USDA) has been excellent. The need for this cooperation is going to continue as more landowners and operators see the value of the Reserve and understand the highly erodible land and wetland conservation provisions of the Farm Bill.

Interim regulations on these provisions were published in the *Federal Register* of June 27. They are going to do more to change soil and water conservation in the United States than any legislation since the 1930's. For the first time, conservation goals will be focused squarely on all Federal farm programs.

Producers who farm highly erodible land must have and follow a locally approved conservation plan if they want to be eligible for most USDA farm programs. Producers who convert wetlands to cropland will not be eligible for those same programs. These provisions apply to the whole farm, not just to the highly erodible land or converted wetland.

Here are some changes we can expect from these provisions:

- They will significantly increase the number of requests from landowners for conservation plans and technical assistance.
- They may increase pressure on SCS to focus assistance on areas with the most highly erodible lands. However, soil conservation will still be important in *all* areas of the Nation.
- They will emphasize the need for cost-effective, practical conservation systems.
- They will make some producers see both SCS and conservation districts as having more regulatory responsibility than before, even though the law does not, in the strictest sense, *require* conservation. Local conservation district officials will have greater responsibility.

We owe it to farmers to give them as much information as possible about how these provisions are going to affect them, and do it in a way they can understand.

Pete Myers

Peter C. Myers
Deputy Secretary
of Agriculture

Cover: Contour stripcropping protects this highly erodible cropland in Greenfield, Wis.

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

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1985 Food Security Act—What Does It Mean?

Farmers will need more help in planning and applying conservation systems.

The 1985 legislation includes four major conservation provisions: (1) the Conservation Reserve, which helps farmers plant grasses or trees on highly erodible cropland; (2) swampbuster, which denies eligibility for certain U.S. Department of Agriculture (USDA) farm programs to farmers who convert wetlands to cropland; (3) sodbuster, which requires conservation systems to continue eligibility of farmers who break out highly erodible fields in order to plant crops; and (4) conservation compliance, which requires conservation systems to continue eligibility of farmers who continue farming highly erodible cropland.

These provisions will reduce soil erosion and improve environmental quality. They will affect every county that has highly erodible lands or wetlands. They will significantly increase the workload of the Soil Conservation Service and local conservation districts.

SCS Chief Wilson Scaling talks about the new farm legislation and how SCS and conservation districts will help farmers comply with its conservation provisions.

Q–Does the 1985 farm legislation make soil and water conservation mandatory?

A–No, it does not make soil and water conservation mandatory. Farmers won't be required to enroll land in the Conservation Reserve. But unless they carry out conservation systems on highly erodible fields that they plant to crops, they will be excluded from certain USDA programs. And if they converted wetlands after December 23, 1985, so they could plant crops, they will be excluded from those same farm programs.

Q–Which USDA programs are you referring to?

A–They are USDA price and income supports, disaster payments, crop insurance, Commodity Credit Corporation storage payments, farm storage facility loans, Farmers Home Administration loans (FmHA), and all other programs where USDA offers payments related to commodity production.

Q–How do farmers determine if their land is highly erodible or if they have wetlands on their property?
A–The Soil Conservation Service is directed by law to make those determinations. The local conservation districts, where they exist, must approve the conservation plans and systems that the farmers will need if they farm highly erodible fields and want to retain their eligibility for USDA programs.

Q–What is the Conservation Reserve Program?
A–The Conservation Reserve is a voluntary program for retiring some of the most erodible cropland in the United States. For the first two signups, almost 70 million acres of cropland nationwide were eligible for the program. Beginning with the August signup, many severely qullied areas also became eligible, bringing the total eligible land to about 80 million acres.

In many cases, yields on these lands are lower than average. Even so, many farmers have come to rely on production from these lands. The Conservation Reserve helps participating farmers make the transition on highly erodible cropland to permanent grasses or trees.

The goal of the Reserve is to encourage farmers to take highly erodible cropland out of production—in all, 40 to 45 million acres by 1990. USDA pays half the cost of establishing grass or trees and an annual rental payment on land accepted for the Reserve. In return, farmers agree to maintain the grass and trees for at least 10 years.

Q–How do farmers sign up for the Conservation Reserve?
A–Farmers who want to enroll land in the Reserve submit bids to the county office of the Agricultural Stabilization and Conservation Service (ASCS). Each bid specifies the payment that the farmer would accept to retire individual fields, through the program. ASCS ranks all bids within each of many substate "bid pools" across the country. The Secretary of Agriculture then establishes a maximum acceptable bid for each pool. Producers whose bids are at or under the established maximum are accepted into the program once SCS determines that their land is highly erodible.

Interested farmers must certify that the land they want to place in the Reserve was planted to an agricultural commodity or used for diverted acreage under a USDA commodity program at least 2 of the 5 years from 1981 to 1985.

Q–Who determines if farmers' land is eligible for the Reserve?
A–SCS soil conservationists determine whether or not the land is highly erodible and thus eligible for the Reserve. This usually means making a trip to the farm to determine land capability and estimate the erosion rate on each field offered for the Reserve.

The land capability system includes eight classes. In general, the higher the class, the less well suited the soil is for crop production. Soils in classes VI, VII, and VIII are generally not suitable for crops but can support pasture or trees. Such lands are automatically eligible for the Conservation Reserve. Capability classes are determined from soil surveys. Where a soil survey does not exist, SCS will make a soil map upon request.

Q–Is land in capability classes VI, VII, or VIII the only land eligible for the Conservation Reserve?
A–Land in classes II, III, IV, or V that has severe soil erosion also is eligible. For the Conservation Reserve, severe erosion means a rate more than three times the "tolerable" rate of soil erosion—the rate at which natural processes can replace the lost soil and still maintain the soil's productivity. Soils eroding at more than two times faster than the tolerable rate are also eligible if the field contains serious ephemeral and gully erosion.

Q–How many signups have there been?
A–There have already been three signup periods for the Reserve—in March, May, and August. ASCS will announce additional signups.

Funds for the Conservation Reserve Program are available through 1987. Congress must appropriate funds to continue the program after that. We expect this to

Rill erosion is one effect of farming highly erodible land without an adequate conservation system.

happen. But, early signup gives farmers a better chance to participate in the program if Congress doesn't extend the funding.

During the first two signups, USDA accepted more than 33,000 applications for some 3.8 million acres. Final figures on the August signup are not yet available.

Q–Who can farmers ask for technical assistance?
A–SCS specialists and State foresters can advise farmers on establishing permanent cover and installing conservation practices as required by conservation plans. Conservation districts, where they exist, approve all conservation plans for lands to be retired under the Reserve.

Q–What are the short- and long-term restraints on farmers who place land into the Reserve?
A–Farmers may not make commercial use of the Reserve land so long as the contract is in effect. This means no grazing or cutting hay on Reserve lands. On land planted to trees, no commercial harvest of any wood product is allowed during the life of the contract. This will minimize economic impacts on the existing cattle, forage, and wood products industries.

Farmers may withdraw from the Reserve at any time. If they do, however, they must reimburse the Government, with interest, for all payments they received for cover establishment and annual rental.

Once the Reserve contracts expire, farmers may choose to return the land to cropland. However, most land retired under the Reserve will be subject to the highly erodible land provisions of the 1985 Food Security Act. This requires the land to be managed according to a locally approved conservation plan if the farmers plan to participate in certain USDA farm programs.

Q–Why were the swampbuster, sodbuster, and conservation compliance provisions needed?
A–The Government has in effect encouraged increased soil erosion and loss of wetlands by promoting maximum production through USDA farm subsidies.

These provisions of the 1985 Food Security Act remove incentives to farm highly erodible land or convert wetlands for crop production. These provisions disqualify farmers from participating in most USDA farm programs if they produce crops on highly erodible fields—unless they follow a conservation plan approved by the local conservation district—or if they convert wetlands in order to plant crops.

Q–How do you define "highly erodible" for the sodbuster and conservation compliance provisions?
A–Soils with an inherent potential to erode at least eight times faster than natural processes can rebuild them are considered highly erodible. The inherent potential for erosion does not consider protection of the soil by crops or conservation practices. For example, any land that has the potential to erode at a rate of more than 40 tons per acre annually if kept fallow all year and didn't have any conservation practices installed would be covered if it had a "T" or tolerance value of 5 tons per acre per year.

Q–What's the main difference between the sodbuster and conservation compliance?
A–In addition to cropping history, the primary difference between the sodbuster and conservation compliance is the effective date for each. Sodbuster applies to any land not used for crop production any time between December 31, 1980, and December 23, 1985 (the date the Food Security Act went into effect). However, farmers who broke out land after that date but planted an agricultural commodity crop before June 27, 1986 (the date that USDA published rules on this provision), will remain eligible for USDA programs for that crop during the 1986 crop year. To retain eligibility for subsequent crop years, however, farmers must use a locally approved conservation system.

Conservation compliance is applicable to highly erodible cropland that was being farmed any year 1981 through 1985. There is a grace period on implementing this provision, however, because of the hardships it would impose on farmers who have already established a cropping history. It would also be an impossible single-season workload for SCS field staffs and local conservation districts to help farmers plan and apply the measures that will be needed for compliance with a conservation plan. Therefore, farmers have until January 1, 1990, to develop and be actively

A conservation system that includes crop rotations, farming on the contour, and gradient terraces with grassed waterways protects this highly erodible cropland in Lorton, Nebr.

applying a conservation plan, and until January 1, 1995, to have it fully in effect.

Where a soil survey of the land is not available, farmers have until 2 years after the soil survey is completed to be actively applying their conservation plans.

Q–What does a conservation plan include?
A–Conservation plans must include specific conservation measures that will not allow excessive soil erosion. They may include such management practices as conservation tillage, stripcropping, or contour farming, which can reduce erosion at a fairly low cost. They may also include practices such as terraces and grassed waterways that are more expensive to install. Some lands are so erodible that erosion can only be controlled by converting the land to grass or trees. Other practices may be needed to control gully erosion. The regulations that were published in the Federal Register on June 27, 1986, say that the conservation plan must provide for the reduction of soil erosion to the tolerable level in most places. The plan may provide for soil erosion up to twice the tolerable level where SCS determines that reduction to a lower level is impracticable. This exception is based on the reasonable judgement of local professional soil conservationists and includes consideration of the economic consequences.

Q–What is the wetland conservation provision of the 1985 Food Security Act?
A–The wetland conservation provision, commonly referred to as "swampbuster," is designed to prevent the needless conversion of wetlands to cropland. Some have estimated that less than half of the wetlands that existed when America was first settled still exist.

Q–Why should wetlands be conserved?
A–Wetlands are some of America's most diverse and productive lands for fish and wildlife. They help control floods by temporarily storing water during storms. They trap pollutants. They help recharge aquifers. And they provide recreational opportunities.

Wetland soils are also often highly productive when drained and planted to crops. Farmers can increase their production dramatically in many cases by draining and converting wetlands. But in doing so they may also diminish a valuable habitat for fish and wildlife and contribute to existing surpluses.

Q–What if farmers do convert wetland to cropland?
A–Farmers who drain and convert wetlands to produce crops are not eligible for certain USDA programs, any year production occurs.

Q–How can farmers determine if they have wetland areas?
A–Wetlands are composed mostly of soils that are covered with standing water or saturated during at least part of the growing season (hydric soils) and that support mostly water-loving (hydrophytic) plants. SCS technicians will help farmers determine whether their land includes wetlands by using soil maps or making onsite inspections.

SCS will publish a list of hydric soils and maintain a list of hydrophytic plants.

Q–Who must comply with the swampbuster provision?
A–Farmers who began the conversion of wetlands before December 23, 1985, are exempt from the swampbuster provision. Farmers who drained wetlands since that date and planted a crop on them before June 27, 1986, retain their eligibility for covered USDA programs for the 1986 crop year only. To retain eligibility on the rest of their farm for subsequent years, farmers must stop producing agricultural commodities on the converted wetland area.

Conversions of artificially created wetlands, including wetlands created by irrigation, are also exempt. Farming wetlands that become dry through natural conditions such as drought—prairie potholes, for example—is allowed under certain conditions, as determined by the Soil Conservation Service.

Q–What will SCS responsibilities be under the "sodbuster," "swampbuster," and conservation compliance provisions?
A–SCS will:
- Identify highly erodible fields and wetlands;

The suitability of land for crop production is determined from Soil Conservation Service soil maps. Soil maps are also used in determining whether or not land is highly erodible or includes wetlands.

- Help farmers develop and carry out conservation plans;
- Determine when farmers are actively applying conservation plans; and
- Determine the adequacy of existing conservation systems.

SCS determines whether the field is highly erodible or a wetland area by consulting soil maps or by visiting the site. SCS is developing a list of soil map units that denote areas of highly erodible soils or potential wetlands. Even where such maps are available, onsite inspections may be required to verify the determination.

Where soil maps are not available—and such maps are not available for about 30 percent of the Nation's nonfederal land area—SCS will prepare them.

Q–What role will conservation districts play under these provisions?
A–Conservation districts, where they exist, must approve all conservation plans in consultation with local ASCS committees. (In the 2 percent of the Nation not included in conservation districts, that responsibility falls to SCS.) With this responsibility, conservation districts become a major partner with USDA in insuring that highly erodible land and wetlands are adequately protected.

Q–What are farmers' options under "sodbuster," "swampbuster," and conservation compliance?
A–Farmers who want to produce agricultural commodities on highly erodible fields or converted wetland have several options:

- They can produce agricultural commodities on highly erodible fields without using an approved conservation plan and lose eligibility for covered USDA programs;
- Likewise, they can produce commodities on newly converted wetlands and lose eligibility;
- They can produce commodities on highly erodible fields that are protected by a conservation system and retain eligibility; or
- They can plant grasses or trees on their highly erodible field (eligible farmers may elect to enter their land into the Conservation Reserve).

Q–What if a farmer disagrees with an onsite determination made by SCS?
A–Farmers may appeal adverse determinations made under the conservation provisions. For SCS, this means that farmers who disagree with an onsite determination made by SCS may request the local SCS representative to reconsider the decision. Those who still disagree may appeal, in sequence, to the area conservationist, State conservationist, and chief. Farmers may also appeal adverse determinations made by other USDA agencies through the normal appeals procedure of the agency involved.

Q–What about conservation easements?
A–Another major provision in the 1985 Food Security Act authorizes the Secretary of Agriculture to purchase and retain easements in uplands, wetlands, or highly erodible lands for conservation, recreation, or wildlife uses for at least 50 years. To qualify for such an easement, the land must secure an FmHA loan that the farmer cannot repay in a timely manner. In return for the easement, the Secretary will cancel a part of the debt at the same ratio of the land entered into the easement compared to the total land secured by the loan.

Q–What do the conservation provisions of this new legislation really mean for farmers?
A–Before now, a producer's decision to become a district cooperator and apply soil and water conservation measures to his or her land was strictly a voluntary decision. Likewise, if a producer chose not to become a district cooperator and not to carry out a conservation plan, this carried no penalties.

Producers can still convert highly erodible land or wetland to cropland, and can continue to farm highly erodible fields that were in production before 1986. They can still sell their products on the free market. However, producers who decline to develop and carry out conservation plans will not be eligible to participate in most USDA programs. Many may see this as a substantial penalty for breaking out highly erodible land, converting wetland, or failing to practice conservation on existing cropland.

Although the provisions are not regulatory in the most restrictive sense, because a producer can still choose to farm without participating in USDA programs, some producers will see the role of USDA agencies and conservation districts as more regulatory than in the past.

Q–What does the new legislation mean for SCS?
A–For SCS, the new legislation will:

- Require even closer cooperation on a day-to-day basis with other USDA agencies than has been required in the past;
- Significantly increase the number of requests for conservation plans and technical assistance in implementing such plans;
- Emphasize the need for high-level technical expertise to develop conservation systems that are cost effective and practical; and
- Require the district conservationist and staff to make decisions that may not be popular with producers who will now be required to install some conservation practices that they may not really want in order to retain eligibility for participation in USDA programs.

Q–What do the conservation provisions of the 1985 Food Security Act mean for conservation districts?
A–Conservation districts will:

- Approve all conservation plans, in consultation with the county ASC committee as required for the highly erodible land provision. This will require a closer working relationship between the district boards and the county committees than has been required in the past;
- Provide more technical assistance than in the past and coordinate State cost-share programs with the provisions of the act; and
- Make decisions that have the potential for adverse economic effects on producers who want to participate in USDA farm programs. This will likely put district supervisors in situations that they have never had to face.

Bidding For The Future: The Conservation Reserve

During the first two signup periods this year, United States farmers enrolled more than 3.8 million acres of highly erodible cropland in the new Conservation Reserve Program (CRP).

The participating farmers will receive an average of $44.23 per acre per year to take this land out of crops and keep it in grass or trees for the next 10 years. The grass and trees will protect the soil from erosion. Costs of establishing the grass and trees will be equally shared by the farmers and the Federal Government.

The CRP is part of a long-range effort by the U.S. Department of Agriculture to stabilize crop production and protect soil and water resources. The program is intended to help farmers retire up to 45 million acres of highly erodible cropland by 1990.

Economists, conservationists, producers, and land-use planners have hailed the new program, which was established by the Food Security Act of 1985, as sound and long overdue. If land has to be taken out of crops to prevent surplus production, they say, then it only makes sense to remove the fragile, highly erodible land that is least suited to crops.

Over the years, the Soil Conservation Service has surveyed, classified, and determined the capabilities and limitations of most of the Nation's soils. Cropland is considered highly erodible and is eligible for the CRP if the soil is in capability classes VI, VII, or VIII. Most of this land is too steep or shallow for cultivation. Also eligible are soils in classes II, III, IV, and V if they are eroding at least 3 times faster than they are being replenished. Soils eroding more than 2 times faster than they are being replenished are also eligible if the field contains serious gullies.

Farmers with highly erodible cropland can offer to set it aside in the CRP through a bidding process. The farmers tell the Government how much money (in dollars per acre per year) they would want to keep the land in grass or trees for 10 years. The Government then accepts the lowest bids it receives during the signup period.

Since there had been no precedent, bidding during the first signup period in March varied widely and only 15 percent of the bids were accepted. A farmer in one State where land values have been traditionally high offered to retire his land for $700 an acre (his bid was not accepted). Other bids were as low as $5 per acre. But during the second signup period in May, the bidding was more consistent and more than 67 percent of the bids were accepted.

Across the Nation, response to the CRP has been as varied as the land and the people who work it. Farmers are generally aware of the financial and environmental costs of cropping highly erodible land. And with technical assistance from SCS and cost sharing through the Agricultural Stabilization and Conservation Service (ASCS), the farmers participating in the program are finding other, more suitable uses for this land.

Greatest response to the program has been in the States with the most eligible land, generally the farming States in the Midwest and South and parts of the West. These States report a heavy workload for SCS field staffs who determine the eligibility of the land and help the farmers plan the land-use conversions. CRP-related activities in some of these States include:

Colorado

With 620,611 acres enrolled, Colorado has more land in the CRP than any other State. So brisk were the signups in Pueblo County that a special exemption was granted to allow 27 percent of the cropland to be enrolled. Normally, no more than 25 percent of the cropland in any county can be placed in the Reserve, a limit designed to minimize the impact of the program on local economies. About 62 percent of the State's total acreage in the program is in three counties: Baca, Kiowa, and Prowers.

Georgia

Of the more than 95,000 acres accepted for the CRP in Georgia, more than 94 percent will be planted to trees. Most of this land is on the Coastal Plain in the southern part of the State.

Idaho

The Idaho Fish and Game Department has provided $25,000 to CRP participants to help pay for the establishment of wildlife plantings—vegetation that provides food, cover, and other elements of wildlife habitat.

Illinois

Soon after the passage of the Food Security Act of 1985, Illinois Director of Agriculture Larry A. Werries organized a 1-day "fly-around" to discuss with farmers the CRP and other aspects of the new legislation. He traveled to several locations across the State and was accompanied by representatives from USDA agencies and the Illinois Association of Soil and Water Conservation Districts.

Indiana

The Lake County Soil and Water Conservation District helped ASCS and SCS during the signups by obtaining a computer and adapting an educational program to calculate erosion rates for farmers who wanted to know if their land qualified for the CRP. The computer program allowed the farmers to see their current erosion rates compared to their future erosion rates if they joined the CRP. It also allowed the farmers to compare the income obtainable under different land uses, which was useful in preparing bids.

Minnesota

By the end of the second signup, Minnesota was first in the number of farmers enrolled (3,458), second in the amount of money that will be paid to the farmers

CONSERVATION RESERVE PROGRAM

($14.3 million), and third in the number of acres enrolled (293,673). Much of the high enrollment has been attributed to a cooperative local, State, and Federal marketing approach that targeted specific audiences, such as retiring farmers and absentee landowners. Other factors that may have contributed include a recent 26 percent drop in average land values in the State and an unusually wet spring.

Missouri
Together with several ongoing State and private programs, the CRP will increase tree planting and the development of wildlife habitat in Missouri. To help with wildlife management, the Missouri Department of Conservation plans to assign a wildlife biologist to work with each of the seven SCS area offices. Wildlife management in the State has historically taken into account both consumptive and nonconsumptive uses of wildlife.

Montana
Enthused about the prospects for wildlife habitat development, the Montana Department of Fish, Wildlife, and Parks set aside $20,000 for the Montana State Nursery to provide trees and shrubs without cost to farmers and ranchers who are establishing permanent wildlife habitat on their CRP land.

New Mexico
Many farmers in New Mexico—where wind erosion is a hazard—are planting windbreaks on their CRP land and installing drip irrigation systems to get the trees started. They will receive cost-sharing assistance on the trees and the irrigation systems.

North Carolina
District conservationists with SCS in North Carolina are reminding farmers that land placed in the Conservation Reserve does not have to remain unproductive. Although the retired land cannot be used for crops such as tobacco, corn, or soybeans, it can produce income if managed for wildlife habitat (by the collection of hunting fees) and future timber crops.

Ohio
Adopting the motto that "Every landholder is eligible until proven differently," the Ross Soil and Water Conservation District made an effort to inform every farmer within its boundaries about the CRP. The district publicized the signups through the media and followed this with letters, telephone calls, and personal visits. This effort was aided by a local paper company that offered to supply tree seedlings and help plant them for CRP farmers willing to obligate their future timber crop to the company. The result was that Ross County accounted for more than 50 percent of Ohio's total enrollment during the first signup and more than 20 percent during the second.

Pennsylvania
In Pennsylvania there is concern about the off-site damages associated with heavy rates of soil erosion, including loss of fish habitat, fewer recreational opportunities in streams and lakes, reduced reservoir capacity, and increased maintenance of navigable waterways. "Society is offering to pay the farmers in exchange for the farmers not causing the erosion and its related off-site damages," said William McSweeney, farm management extension specialist at The Pennsylvania State University.

Tennessee
USDA agencies, State natural resource agencies, and private farm and wildlife groups in Tennessee made a joint effort to explain the program to every farmer in the State who has eligible land. This effort, which had resulted in the enrollment of 72,000 acres by the end of the second signup, was helped by about 115 members of the SCS Earth Team, volunteers who made telephone calls to farmers, wrote newspaper articles, and organized informational meetings.

"I've been pleasantly surprised," said SCS State Conservationist Don Bivens, "about the concern for water quality. Tennessee has a clean-water campaign underway and this fits right in with it. It seems like nobody in Tennessee wants muddy water anymore and this program is going to make a real difference."

Texas
Texas farmers wanting to develop wildlife habitat are encouraged to plant annual food plots near the permanent CRP vegetation. Annual food plots are particularly beneficial to highly mobile species such as wintering waterfowl and can be planted on acreage set aside in the Acreage Conservation Reserve, another program administered by ASCS. The combination of annual and permanent vegetation will provide wildlife food and cover throughout the year.

Utah
An outdoors writer in Utah said the CRP could do more for restoring pheasant populations than any other development over the past 30 years. He said it will also improve water quality for fisheries and nongame wildlife.

Wisconsin
A forester in Wisconsin called the CRP the largest tree-planting program in United States history. According to Jeff Martin, forester with the University of Wisconsin Cooperative Extension Service, people in Wisconsin have been planting about 20 million trees per year and that figure could grow to 30 million under the CRP. He said it may take State and private nurseries a couple of years to gear up to meet the demand for seedlings.

"Trees help control soil erosion by water, provide wildlife habitat, improve water quality, beautify the landscape, protect fields from wind erosion, and eventually provide firewood," said Martin. "Besides that, many people simply like to plant trees."

Compiled by **Paul D. Barker,**
associate editor, *Soil and Water Conservation News,*
SCS, Washington, DC

USDA Issues Rules for Highly Erodible Land and Converted Wetlands

The U.S. Department of Agriculture (USDA) announced interim rules on June 25, 1986, to implement sections of the 1985 Food Security Act designed to remove inconsistencies between soil conservation goals and traditional farm commodity program benefits.

Effective immediately, producers who fail to meet the interim rules will not be eligible for commodity price support and other program payments, disaster payments, crop insurance under the Farm Crop Insurance Act, Farmers Home Administration loans, farm storage facility loans, and other farm program benefits.

USDA's action is designed to reduce soil loss caused by wind and water erosion; protect the Nation's long-term capability to produce food and fiber; reduce sedimentation and improve water quality; assist in preserving the Nation's wetlands; and lessen the incentives to produce agricultural commodities on highly erodible farmland.

With regard to highly erodible land, farmers will have a grace period to implement a conservation plan on land that was cultivated in any of the years 1981–85. Many will be able to develop and apply a conservation plan that will allow them to plant highly erodible land to grasses or trees either on their own or in conjunction with the Conservation Reserve Program.

Before January 1, 1990, or until 2 years after the Soil Conservation Service prepares soil maps for a particular area, producers will not lose eligibility under the highly erodible land conservation provisions for farm program benefits as the result of production of an agricultural commodity on highly erodible fields that were (a) cultivated to produce any of the 1981 through 1985 crops of an agricultural commodity; or (b) set-aside, diverted or otherwise not cultivated under a program administered by the Secretary of Agriculture for any such crops to reduce production of an agricultural commodity. These exemptions allow affected persons to continue the production of agricultural commodities on highly erodible fields through January 1, 1990 (or until 2 years after SCS maps the land) without having to actively apply a conservation plan to retain program eligibility.

The provisions of the Food Security Act of 1985 which the interim rules implement are commonly referred to as conservation-compliance, sodbuster, and swampbuster provisions. Sodbuster provisions apply to any highly erodible land cultivated for crop production since December 23, 1985. Swampbuster provisions apply to the conversion of wetlands after December 23, 1985, for the purpose of producing agricultural commodities.

However, farmers who cultivated highly erodible fields or converted wetlands after December 23, 1985, and planted a crop before the date the interim rule is published will remain eligible for USDA program benefits for the 1986 crop year. To retain eligibility for subsequent crop years, however, the farmer must apply an approved conservation system on the highly erodible field. With regard to wetlands converted after December 23, 1985, the farmer cannot, except under limited circumstances, produce agricultural commodities on such lands after the date of publication of the interim rule and retain eligibility for farm program benefits.

Additional details of the interim rules were published in the June 27 Federal Register. The interim rule provided a 60-day public comment period ending on August 26.

There are an estimated 345 million acres of highly erodible agricultural land in the United States, of which 118 million acres are existing cropland and 5 million acres are wetlands with a medium-to-high potential for conversion to agricultural use.

Symposium Stresses Multiple Benefits of Windbreaks

The latest developments in research, design, and establishment of windbreaks for conservation highlighted the first International Symposium on Windbreak Technology held in Lincoln, Nebr., June 23–27.

More than 375 people attended, including 100 speakers from 14 countries. The Soil Conservation Service sponsored the symposium jointly with several private and other public agencies and groups.

J.W. Sturrock of the New Zealand Department of Scientific and Industrial Research, in the keynote address, said that limited crop water supplies and higher costs of irrigation will require the use of windbreaks for conserving crop water.

"Combining windbreaks or shelterbelts with the production of commercial timber will gain in importance," Sturrock predicted.

"Making shelter needs and wood production compatible is important not only to increase the economic return from windbreaks," he said, "but also to counter the sometime unrealistic divorce of agriculture and forestry."

Symposium presentations emphasized the potential of windbreaks to increase crop and livestock production, decrease wind erosion, conserve energy, provide wildlife habitat, and assist in snow management.

Windbreaks, along with narrow field widths, crop residues left on the soil surface, and rough soil surfaces, are important factors in reducing wind erosion. In some cases, field windbreaks may provide the only wind erosion control measure in drought years.

Three symposium publications are or soon will be available: (1) abstracts of the symposium papers, compiled in a proceedings, $7, (2) a bibliography of publications dealing with windbreaks, $15, and (3) a textbook to be developed from selected symposium presentations, by January 1987, $45. Address all requests for these publications to: International Windbreak Symposium, 101 Plant Industry, University of Nebraska-Lincoln, Lincoln, Nebr. 68583-0814.

Farm Family Takes Stand Against Soil Erosion

"Gully erosion was depleting our topsoil," said Jessie Stanford of Abbeville, Ala. "We were losing vast amounts of topsoil during the spring months, especially after the fields had been plowed before planting. With the soil loosened, a hard rain would cause small gullies that were difficult to cross with our farm equipment."

Stanford, who has been farming in the Bethlehem Community of Henry County for over 37 years, raises mainly peanuts, corn, and hogs. He's been farming the same fields since he was a child.

After several years of patching gullies in some of those fields, Stanford contacted the Soil Conservation Service field office in Abbeville for information and a cost estimate on ways that he could manage his soil resources better.

Stanford was familiar with the services that SCS provides because his father had been a cooperator with the Henry County Soil and Water Conservation District, and Stanford himself had worked with SCS through the conservation district on installing an animal waste lagoon on the farm about 6 years ago.

Stanford was particularly concerned about three fields on which he was growing peanuts in a 2-year rotation with corn or small grains. One field was 16 acres, one was 9 acres, and one was 5 acres.

Considering the 30 acres included in the three fields together, SCS estimated that Stanford was losing 16 tons per acre per year from sheet and rill erosion on 27 acres and 148 tons per acre from gully erosion on 3 acres. The "T" value, or acceptable annual soil loss, for the soils on the farm is 5 tons per acre per year.

"In Alabama, current methods of growing peanuts leave the soil exceptionally vulnerable to erosion in the spring and summer because the soil is loose and bare following land preparation and planting, and heavy rains usually occur during this period," said Earl Norton, SCS State Resource Conservationist in Auburn, Ala.

"Alabama agricultural experiment station scientists at Auburn University are working on conservation tillage methods for growing peanuts that would involve leaving crop residues from a cover crop on the soil to protect it from erosion. However, this technology is still in the development stage," said Norton.

To reduce the soil erosion on Stanford's fields, SCS recommended that he construct terraces using existing grassed waterways on two of the fields and construct terraces with underground pipe outlets on the other one for which there was no suitable area for constructing a grassed waterway.

The cost of constructing terraces on the two fields with existing waterways was estimated at $100 per acre. On the field that needed to have terraces and an underground outlet installed, the estimated cost was $200 per acre.

The Agricultural Stabilization and Conservation Service (ASCS), working through the local ASC county committee, provides cost sharing to landowners at a 60-percent rate for installing conservation practices that control soil erosion on cropland fields. Based on this information, Stanford decided to terrace the fields and to apply for ASCS cost-sharing assistance.

After ASCS approved Stanford's application, SCS laid out and designed 6,566 feet of parallel terraces, 313 feet of a 6-inch diameter underground pipe outlet system, and a 0.2-acre filter strip.

With the help of his son, Jessie, Stanford did most of the work with his own equipment. This help cut some of the costs. Stanford constructed the terraces with his tractor and bottom plow. He borrowed other equipment to fill in the gullied areas and to haul dirt adjacent to the tile pipes. He hired a contractor to dig the trench for the underground pipe.

After completing the job, Stanford said, "The terraces weren't that hard to build, but filling the gullies was the key to getting a good parallel terrace system in. Also, the tile pipe system where there used to be a badly washed out area improved the looks of the field. The pipe system removes the rainwater slowly from the field so it no longer causes gullies."

Said Stanford, "Eroded land cuts your yields. I believe you get top yields from land that has been treated properly with terraces for controlling erosion. I want to leave the land in better condition for my children so that they can run the farm and reap the same benefits from the soil that I have."

James L. Smith,
district conservationist, SCS, Abbeville, Ala.

Adapted from an article in the April 23, 1986, issue of *Southeast Farm Press.*

On his farm in Abbeville, Ala., Jessie Stanford (left) and his sons, Ira (center) and Jessie check maturity of peanuts on a field protected by a parallel terrace system with an underground outlet. Runoff collects at the pipe and is carried underground to a stable outlet.

Moving?

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New Publications

Environmental Control for Agricultural Buildings

by Merle L. Esmay
and John E. Dixon

The primary function of most agricultural buildings is the modification of outside climate. Therefore, some level of environmental control is necessary for livestock and poultry production, plant growth during certain seasons, storage of agricultural products, and machinery and equipment protection. This book describes the principles and dynamics of environments in agricultural buildings. It provides information on heat and vapor transmission, ventilation and air flow, and waste management in enclosed environments. Other topics covered include psychrometrics (air-water vapor relationships); heat production in poultry and livestock structures; air flow patterns; animal physiology and homeotheramy; hot weather environment; cattle, swine, and poultry environmental systems; potato storage; and plant growth structures.

This text can be used for teaching courses in agricultural engineering and technology, or it may be useful to engineers and system designers. A few example problems are included with each chapter.

Copies of this 287-page text is available for $45 from AVI Publishing Company, 250 Post Road East, P.O. Box 831, Westport, Conn. 06881.

Conservation Planning—You and Your Land

by the Soil Conservation Service

This brochure describes the assistance that the Soil Conservation Service can give to land users as they make land use and treatment decisions. It tells of the many ways in which SCS can provide assistance in planning and implementing the conservation practices that go into making a successful resource management system.

For a copy of this brochure (Program Aid Number 1376), or for more information on developing a conservation plan, contact the local office of the Soil Conservation Service.

Pesticide Resistance: Strategies and Tactics for Management

Published by the National Research Council

The number of noxious insects, weeds, rodents, and plant pathogens that are resistant to pesticides is growing at an alarming rate. Yet, the rate of introduction of new pesticides has slowed dramatically during the last few years. The potential crop losses and disease epidemics posed by this situation prompted the National Research Council to sponsor a symposium that would bring together experts from a wide range of disciplines. Integrated into this book of symposium papers is a report by the Committee on Strategies for the Management of Pesticide Resistant Pest Populations. The book explores the problem of pesticide resistance; suggests new approaches to monitor, control, or prevent resistance; and identifies the changes in public policy necessary to protect crops and human health from the ravages of pests.

The book should be of interest to chemists, plant and insect scientists, ecologists, geneticists, chemical industry managers, health organizations, as well as policymakers and others involved in pest control.

This 471-page book is available for $28.50 from National Academy Press, 2101 Constitution Avenue, NW., Washington, DC 20418.

Fertilizer Technology and Use

Edited by O.P. Engelstad

The third edition of this highly successful and popular book embodies the latest developments in fertilizer technology and use. The authors present current information on such topics as fertilizer markets; soil and tissue testing; production, marketing, and use of nitrogen, phosphorus, and potassium fertilizers; fertilizer use in relation to the environment, which includes concerns for nonpoint source pollution effects; and modern techniques in fertilizer application.

The 633-page text should be of particular interest to university staff and students, fertilizer industry representatives, and others with an interest in agriculture.

Fertilizer Technology and Use is available for $40 ($32 to Soil Science Society of America members), from SSSA Headquarters Office, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

Methods of Teaching Agriculture

by L.H. Newcomb,
J. David McCracken,
and J. Robert Warmbrod

Competence in teaching methods, along with competence in technical subject matter, is essential to be effective as a teacher of agriculture. This text has been designed to help teachers and those preparing to be teachers become proficient at planning, managing, delivering, and evaluating instruction.

There are sections on specific methods of teaching. These are divided into two categories: methods used in group oriented instruction and methods which are centered more on the individual's pursuit of learning. A key feature of the book is its emphasis on problem-solving, which involves teaching students to think and reason, as opposed to just memorizing facts.

The book also evaluates other teaching techniques, offering suggestions to improve them and ultimately student learning. In addition, there are sections on discipline, program planning, teaching the handicapped, teaching adults, evaluating instructions, and applying learned material. A sample lesson plan is included in the appendix.

The book can be used as the basic undergraduate method's text and is also suitable for use in several graduate courses.

This 362-page text is available for $16.95 from The Interstate Printers & Publishers, P.O. Box 50, Danville, Ill. 61834–0050.

Field Measurement of Dinitrogen Fixation and Denitrification

Edited by R.D. Hauck
and R.W. Weaver

Papers in this book come from symposiums held by the Soil Science Society of America (SSSA) at their annual meetings. The authors explain and discuss the advantages and limitations of two measurement techniques being increasingly used by many scientists to measure nitrogen gain and loss under field conditions. The techniques are: the isotope-dilution technique for estimating biological nitrogen fixation and the acetylene blockage technique for estimating denitrification.

This 115-page book is available for $18 ($15 to SSSA members) from SSSA Headquarters Office, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986—490-922/40006

7/7

October 1986 Volume 7, Number 7

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service

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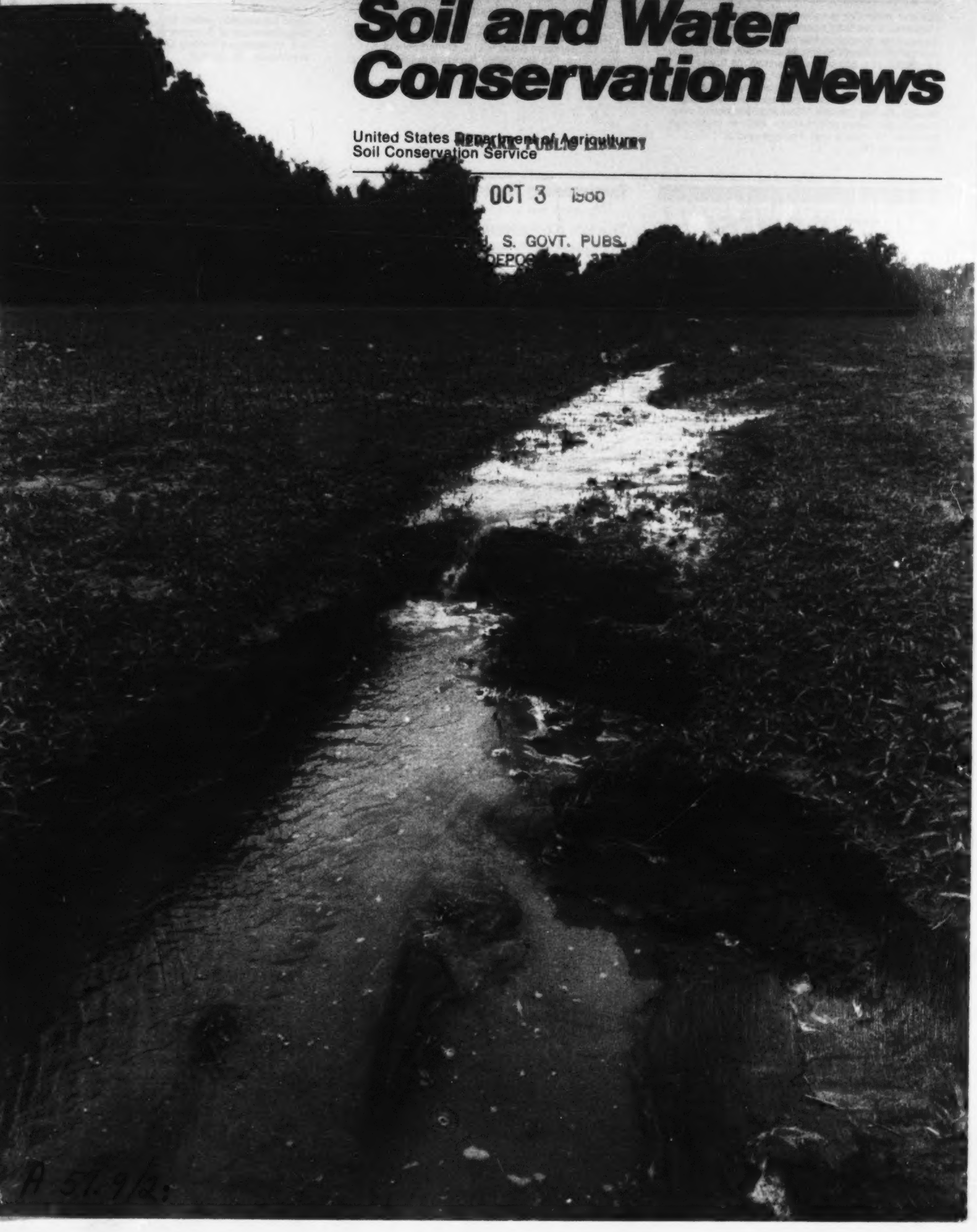

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN–0199–9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013–2890.

Subscriptions
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Comments:
From the SCS Chief

Improving Our Ability to Measure Soil Erosion

The Soil Conservation Service has made extensive use of the Universal Soil Loss Equation (USLE) and the Wind Erosion Equation (WEQ) to estimate soil erosion.

Conservationists use the soil loss estimates derived from the USLE and the WEQ to develop alternative resource management systems. When they are applied, the systems reduce soil loss to tolerable levels.

These equations become more important as SCS strives to meet its responsibilities under the conservation title of the Food Security Act of 1985. Under the act, SCS, when requested by a land user, determines whether land is highly erodible and thus eligible for the Conservation Reserve Program. SCS also determines whether land is highly erodible and subject to the conservation compliance provision or the sodbuster provision if a land user wants to participate in certain U.S. Department of Agriculture (USDA) farm programs.

Research has provided additional information on the soil erosion process since the last major revision of the USLE in 1978. It is, therefore, timely that work is underway to update the USLE and, additionally, to develop procedures for estimating ephemeral gully erosion on cropland.

USDA's Agricultural Research Service (ARS) is updating the USLE with assistance from SCS and other agencies. A first draft of the updated manual for users is expected to be completed in 1987.

Meanwhile, ARS has begun a long-range project to develop an improved water erosion prediction model. Emphasis is on estimating rill and interrill erosion and on erosion caused by concentrated waterflow. Cooperating in this project are SCS, the USDA Forest Service, the U.S. Department of the Interior's Bureau of Land Management, the State agricultural experiment stations, and the U.S. Department of Energy. Efforts are also underway to develop an improved wind erosion prediction model.

We in SCS, as the major users, look forward to this improved technology. It will help us give better conservation technical assistance to conservation district cooperators and others who depend on us for this help.

Wilson Scaling

Cover: Gully erosion on a West Tennessee farm following a rainstorm. (Photo by Tim McCabe, photographer, SCS, Washington, DC.)

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

All programs of the U.S. Department of Agriculture are available to everyone without regard to race, color, national origin, sex, age, or handicap.

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The Universal Soil Loss Equation—Where It Came From, Where It's Going

Soil conservationists in many countries today make use of the Universal Soil Loss Equation (USLE) to predict soil loss from erosion by rainfall and runoff on agricultural land.

Developed by U.S. Department of Agriculture (USDA) specialists and cooperating university scientists, the USLE grew out of efforts started in 1940 to develop a soil-loss estimating procedure for the Corn Belt. This resulted in a procedure called the slope-practice method.

Austin W. Zingg, a Soil Conservation Service soil conservationist, later a USDA Agricultural Research Service (ARS) technical staff specialist, described the equation in an article in *Agricultural Engineering* in 1940.

Dwight D. Smith, ARS agricultural engineer, soon added crop and conservation practice factors and the concept of a specific soil loss limit to Zingg's equation. Smith also developed a graphic method for determining effective conservation practices on selected soils in the Midwest.

Other scientists added soil and management factors to the equation and prepared a set of tables to simplify its field use in Iowa. At about the same time, SCS specialists worked successfully with scientists in the north central States to develop the slope-practice equation for use throughout the Corn Belt.

After 1945, a number of publications reflected the research work that had been done to develop a universal soil loss equation during World War II. A national committee met in Ohio in 1946 to adapt the Corn Belt equation to cropland in other regions. This led to the addition of a rainfall factor to the equation.

This new formula became known as the Musgrave equation, for G. W. Musgrave, an SCS research specialist. The formula was widely used to estimate gross erosion from watersheds in flood abatement programs. SCS also began to use it at about that time in the northeastern States.

The ARS National Runoff and Soil Loss Data Center was established in West Lafayette, Ind., in 1954 in cooperation with Purdue University, to carry out erosion studies. The center assembled a very large amount of information, then summarized and analyzed it: more than 10,000 plot-years of basic runoff and soil loss data, available from Federal and State cooperative research projects at 49 locations. ARS later sent out rainfall simulators from bases in Indiana, Georgia, Minnesota, and Nebraska to a total of 16 States to obtain additional information.

Walter H. Wischmeier was another name intimately associated with the USLE in those and many succeeding years. He devoted much of his career as professor of agricultural engineering at Purdue and as ARS research statistician to studying soil erosion. He and Smith were the developers of the USLE as we know it today. They developed the first USDA handbook, issued in May 1965, to explain the USLE and how it could help in conservation planning. They also prepared an update of the manual in 1978, the version still in use today.

The USLE included several improvements: a rainfall erosion index based on local rainfall characteristics; a quantitative soil erodibility factor evaluated directly from soil property data, independently of topography and rainfall; a method of evaluating cropping and management effects in relation to local climate; and a method of accounting for the effects of interactions among crop system, productivity level, tillage practice, and residue management.

Other ARS scientists were among the researchers who became well known in the 1960's and 1970's for their contributions to the growing store of knowledge about basic soil erosion processes: Calvin K. Mutchler, for adapting the USLE to the Delta area in the Southeast; A. P. Bonnett, for adapting it to the southeastern Piedmont and the Coastal Plain; Donald K. McCool, for adapting it to the Pacific Northwest; and Kenneth G. Renard, who adapted it for use on rangeland.

William C. Moldenhauer also made contributions while serving as head of the ARS National Soil Erosion Research Laboratory (NSERL). This lab was established in West Lafayette, Ind., on the Purdue University campus in 1981.

George R. Foster is one of several scientists now doing fundamental research on erosion processes at NSERL. He also is leading the effort to revise the USLE handbook and, simultaneously, he is serving as leader of the USDA Water Erosion Prediction Project (WEPP). The WEPP is unique: It is the first time that so many ARS research centers and so many agency users have combined forces to deliver a new technology.

If commitment and expertise make the difference in finding answers to the questions remaining about soil erosion by water, Foster and his associates in WEPP are bound to find them.

Nadine E. Pitts,
writer-editor, Public Information Staff, SCS, Washington, DC.

A Purdue University graduate student collects bottles of runoff at the bottom of a slope under a rainfall simulator at the ARS National Soil Erosion Research Laboratory in West Lafayette, Ind. The sediment content of the runoff will be measured and recorded. A furnace filter (left background) is used to duplicate the effect of 100-percent ground cover.

Conservation Features

Improved Irrigation Protects Water Supply

When it comes to water quality, everyone in Suffolk County, N.Y., on the eastern end of Long Island, is in the same boat. The county's 3 million residents, including fruit, vegetable, and nursery crop growers, obtain their water from a single underground aquifer.

Although the area receives about 45 inches of precipitation a year, not enough rain comes during the summer growing season for most of the county's crops. As a result, local growers must irrigate.

But irrigation must be done properly if it is to meet the needs of the crops and protect water quality. The sandy soils in Suffolk County have a very low water-holding capacity. Irrigation applications should be light and frequent. Otherwise, over irrigation can leach valuable nutrients from the root zone and degrade water quality. Excess irrigation water can also wash sediment and other pollutants into estuarine areas.

Most of the irrigation systems in the county are portable pipe sprinkler systems, and a major problem is the use of different nozzle sizes. This results in different rates of application and can cause wet spots and dry spots in a field.

Portable pipe also tends to leak because it's difficult to properly connect pipes that run across uneven ground. Leaks waste water and make it difficult to maintain proper water pressure in the pipe. As a result, water is applied unevenly, which reduces crop quality and yield. Leaks also cause soil erosion.

SCS, the Suffolk County Soil and Water Conservation District, and the U.S. Department of Agriculture's Agricultural Stabilization and Conservation Service (ASCS) and Cooperative Extension Service recently began a project to provide the growers with technical and financial assistance to improve their irrigation systems and practices. The goal of the project is to help the growers improve their operations while protecting Long Island's fragile water supply.

After a grower requests assistance, specialists from SCS and the district conduct an onsite investigation. They measure how much and how fast irrigation water is applied, how evenly it is distributed, and how efficiently the system uses labor, energy, water, and time. Containers are placed at regular intervals within the test area to collect water during irrigation. The volume of water in each container is measured to check the application rate and evenness of distribution. The specialists then recommend any changes needed to make the system more efficient and help the grower to develop an irrigation water management plan.

Allan Connell (left), SCS district conservationist in Riverhead, N.Y., and Tom McMahon, a district technician with the Suffolk County Soil and Water Conservation District, check water pressure at selected sprinklers along a wheel roll irrigation system. Irrigation system evaluations are the first step in a project intended to help farmers improve their irrigation efficiency.

Cost-sharing funds are provided by ASCS, which in 1985 provided a total of $42,000 to help 13 farmers improve their systems. "The district designed, laid out, and checked irrigation systems that our office had approved for cost sharing," said Frank Bender, the ASCS representative in Suffolk County. "Farmers can receive up to $3,500 in assistance," he said. "So far, most of the money has gone to farmers installing underground mainlines."

Underground mainlines have several advantages. They conserve water by eliminating leaks in portable distribution lines and protect the quality of groundwater by reducing the leaching of fertilizer and pesticides. Growers can irrigate more frequently and apply less water per irrigation.

"Installing underground mains was the best thing I ever did," said Avery Young, a potato grower in Aquebogue who received assistance in the project. "I used to spend much of my time moving portable pipe. I never felt comfortable irrigating at night for fear of the portable pipe coming apart and flooding my field."

John Kujawski and his brother Ray farm more than 500 acres, growing potatoes, onions, and grain. They irrigate with wheel roll systems, water guns, and portable sprinkler systems, and they recently installed 1,060 feet of irrigation mainline.

"SCS helped us to develop a management plan so that we know how long to operate our systems and how much water we are applying," said Ray Kujawski. "Now we can irrigate one field in half the time it used to take."

A lot of people in Suffolk County depend on growers like Young and the Kujawski brothers—not only for the crops that they grow, but also to help protect the quality of the water that they all share.

Allan Connell,
district conservationist, SCS, Riverhead, N.Y.

Jean Krebs,
information assistant, SCS, Syracuse, N.Y.

Nursery Operator Sows Grass, Sets Example

Harry Park is planting more than grass. He's planting an idea.

Park is a nursery operator in Multnomah County, Oreg., who sows field brome between his rows of ornamental plants to protect the soil from erosion. He hopes the idea catches on.

Although Park is convinced that field brome is one of the best cover crops he's used, there aren't enough people using it yet to assure a good market for the seed. So, while Park has been enthusiastic about field brome for quite a few years, he hasn't always been able to get the seed.

The Park Nursery first started using field brome in 1975 when the local field office of the Soil Conservation Service obtained seed for a trial planting. Park tried the field brome, found it to be an excellent cover crop, and used it for several years until he could no longer find a commercial source for the seed.

Unable to get field brome, Park used other cover crops, such as cereal grains, but found they were harder to control and had to be mowed. Then, a couple of years ago, when SCS Soil Conservationist Jan Jinings was making a routine call on the nursery, Park asked where he could get field brome seed again.

Jinings made some calls and found that a farmer in nearby Yamhill County had agreed to plant field brome for seed on 4½ acres. This planting produced about 4,500 pounds of seed—much more than expected and enough so that several other nurseries could try the brome. Cost of the field brome is competitive with the more often used cereal grains.

The brome doesn't grow well between shade trees, but Park finds it to be the best cover crop he has used in the narrow (5-foot) space between rows of ornamentals. He spreads about 10 to 12 pounds to the acre.

"That's a pretty small amount of seed, so we've found the best way to seed is with a lawn spreader," said Park. In the past, Park used the spreader and then came back with a cultivator. After trial and error, he improvised a small spiked harrow to drag behind the 30-inch spreader. The harrow cuts little grooves that make the emerging grass look like it was drilled and, according to Park, the seed seems to germinate better.

Field brome was brought to the United States in the early 1940's from Sweden for testing as a forage grass. But it wasn't until it was tested as a cover crop in the 1950's that its value as a conservation plant was discovered. It is so similar to other, more weedy bromes, however, that it has never gained much popularity for erosion-control plantings.

"When you plant a cover crop, you have to think about whether it will do the job. Then, can you control it? Next—the hardiness of it—will it take our winters? Then, of course, its availability—that's the one problem we've had with the field brome," said Park.

Field brome can meet the rest of Park's requirements. It produces a soil-holding root system three times greater than ryegrass. Since it doesn't form seedheads until about 5 weeks later than other brome varieties, it is much easier to control. Growers have until mid-June to work it under, yet the growth is low through the winter with no rank above-ground canopy until spring. Planting time is in September, which gives it time to produce a nice cover mat by the time the fall rains come.

Park started farming here in 1947, growing vegetables. He said he switched to the nursery business in 1955 because of labor problems. "With nursery stock, if you don't pick it today or next year, it's just worth more money. With vegetables, if there's a delay in harvest, you lose your crop." Park said another advantage of nursery farming is that, unlike growing seasonal crops, it's a year-round job that can provide a year-round income.

Many other farmers in the area evidently agree with Park because a large portion of the State's nursery production comes from this area. Ornamentals, which grow well in the mild climate and heavy rainfall here, are shipped to markets all over the country.

A lot of the ornamentals are grown on hilly or gently sloping fields that are subject to erosion. SCS has placed special emphasis in Multnomah County and six other counties in the area for technical assistance to curb the high rate of erosion. SCS estimates that more than 40,000 tons of soil is lost each year from the nurseries in the area.

More and better use of cover crops could help to bring this loss down to an acceptable rate. Other nursery operators have toured Park's nursery to see the field brome, and many are beginning to take note of its benefits. Park tells them that seeding field brome is one of the best things they could do. It's an idea that he hopes grows.

Shirley Boothby,
retired public affairs specialist, SCS, Portland, Oreg.

At his nursery in Portland, Oreg., Harry Park (left) and SCS Soil Conservationist Jan Jinings examine stand of field brome planted between rows of ornamentals to protect the soil from erosion.

California Volunteers Head for the Hills to Seed Burned Slopes

"One Saturday is not a lot to ask," said Ulli Kummerow about volunteering to help reseed the charred Santa Cruz Mountains in California. "Sometimes, we have to do something larger to feel that we're making a difference."

The July 1985 "Lexington Fire" in California's Santa Cruz Mountains blazed for 10 days, jumping erratically from ridge to ridge, enveloping hillsides with fire and smoke, destroying 24 homes, and damaging scores of other properties. The fire burned over 13,800 acres, caused $7 million in damages, and cost $1.2 million to fight.

The fight didn't end when the fire was out. Something had to be done to protect the blackened, bare hillsides from the Pacific storms that pound the Santa Cruz Mountains every winter. Even properties that survived the fire would have been exposed to localized flooding and mudslides, and miles of fish and wildlife habitat would have been destroyed.

Immediately after the fire, Green Again, a homeowners association, requested assistance from SCS and the Evergreen and Santa Cruz County Resource Conservation Districts (RCD's). The SCS and RCD staffs provided information to the property owners about fire damage and erosion control.

SCS hired three temporary emergency-aid employees to help prepare damage reports, organize the erosion-control work, and provide information to concerned groups and the news media. The SCS and RCD staffs conducted a workshop to instruct landowners on how to "erosion proof" their steep slopes, damaged by the fire and fire-fighting equipment.

The Santa Clara Valley Water District, concerned that sediment from the bare hillsides would reach water supply reservoirs, provided grass seed and straw mulch free of charge to landowners who had completed a damage report approved by SCS and the RCD's. The seed was an erosion-control mixture developed by an SCS plant materials specialist working with the SCS field office staff at Aptos. The seed mixture consisted of Blando brome and 'Hykon' rose clover. For shady areas, creeping red fescue was used instead of the rose clover.

A distribution center for the seed and straw was set up at a fire station of the California Department of Forestry and staffed by the water district 7 days a week. An SCS employee was on hand during peak hours to answer questions about the damage reports and erosion-control recommendations.

Despite the efforts of SCS, the RCD's, and the water district, it became apparent in a few weeks that the job was too big for the landowners to tackle alone. The rainy season normally begins in the mountains in the middle of November, which meant that the seeding would have to be completed by the middle of October.

Many felt helpless. "I don't know. I'm still scratching my head wondering what to do," said one landowner, Hilda Zuck. "It's enough just to put your house back in order. Then—to worry about the land—I can't see the three of us getting out there and covering 4 acres before winter."

In response, the RCD's and SCS recruited volunteers through newspapers and radio and television stations. Shortly after the announcements began, volunteers kept the telephones ringing at the Aptos and Gilroy SCS field offices.

With studio time, equipment, and technical assistance donated by a cable television firm in San Jose, SCS produced a videotape to demonstrate how to apply the seed and mulch. The tape was shown to interested landowners at the seed and straw distribution center, and additional copies were loaned to volunteer groups.

"The media were very sympathetic to our cause," said Richard Casale, SCS district conservationist at the Aptos, Calif., field office.

Workshops were held at which the volunteers were shown an SCS slide show on how to apply the erosion-control measures. Although the volunteers were asked to sign a waiver of liability to protect the landowners, the Santa Clara County Office of Emergency Services offered Workers' Compensation Insurance to those who completed the training and safety instruction.

Many volunteers came from Boy Scout and Girl Scout troops, churches, high schools, special interest groups, and civic organizations. Some people came from as far as 50 miles away to donate a day or more. The Santa Clara County Sheriff's work crew, consisting of those sentenced to public service work for drunken driving and other offenses, also provided needed help.

As the mid-October seeding deadline approached, the South Bay Sterling Institute of Relationships, a group committed to helping people help each other at the local level, contacted SCS and offered to help organize and recruit volunteers for a 1-day crash project. The group selected Saturday, October 5th, for "Project Mudbuster." With assistance from an SCS public affairs specialist, the group launched a media campaign that drew more than 300 volunteers.

The volunteers were bussed to and from work sites. Rest stations were set up and equipped with food, water, shade, and first aid, all provided by the Red Cross. As television crews and newspaper reporters watched, the volunteers worked all day constructing water bars, smoothing out

Volunteers spread straw on newly seeded areas of burned slopes in the Santa Cruz Mountains in California.

areas disturbed by bulldozers, throwing seed, and spreading straw mulch. As it was spread, the straw changed hundreds of acres from ash and blackness to gold.

"Project Mudbuster" volunteers were rewarded with the breathtaking view from the mountains, the quiet satisfaction of helping to conserve the land, and a celebration with live music and homemade refreshments at the end of the day. Many volunteers said they helped because they had a special feeling about the Santa Cruz Mountains.

In all, volunteers and property owners sowed and covered by hand more than 2,000 acres of the most critical areas with 56,000 pounds of seed and more than 12,700 bales of straw. The California Department of Forestry, in cooperation with SCS and local sponsors, aerially seeded the remaining 12,000 acres with annual ryegrass. By the time the winter rains began, the entire burned area was seeded to new grass.

To help pay for the project, the Santa Clara Valley Water District donated $50,000, Santa Clara County donated $50,000, the Soquel Creek Water District donated $5,000, Santa Cruz County donated $2,000, and the Green Mountain Project donated $2,000. This last group, the Green Mountain Project, raised money through raffles, benefit dinners, T-shirt sales, and an old-fashioned firemen's muster.

Obvious benefits of the project include the preservation and protection of the Los Gatos Creek Watershed, Lake Elsman, and the Lexington Reservoir. But the intangible benefits are in the hearts and minds of the volunteers and members of the community who worked together to complete local goals at the local level.

Kummerow and hundreds of other volunteers really did make a difference in California's Santa Cruz Mountains.

Sheryl Mitchell,
former soil conservationist, SCS, Aptos, Calif.

Conservation Helps Rancher Survive Drought

A Montana rancher credits soil and water conservation practices with helping him to survive a prolonged drought.

"Without my grazing system, I would be in much worse shape financially," said Edward J. Grady, Jr. "I probably would have had to sell some cattle like a lot of other people had to do."

Grady is a second-generation rancher in Lewis and Clark County. He usually keeps about 350 cows, 200 yearlings, and 25 bulls on his 13,500-acre ranch in the Canyon Creek area.

Normally, his ranch receives about 15 inches of rainfall a year. But the area withered through nearly 4 years of unusually dry weather, ending with heavy storms in the fall of 1985. Grady was able to get through the drought without even a partial cattle liquidation.

With assistance from the Soil Conservation Service, Grady began developing a conservation grazing system in 1981, before the drought began. The system is part of a long-range plan for his ranch that has included spring developments, improved irrigation systems, fencing, stock water pipelines, and timber harvests.

"My range was in much better condition during the drought than it otherwise would have been," Grady said, "and I didn't have to alter my grazing even though it was the driest period in the area's recent history."

Grady is a cooperator with the Lewis and Clark Conservation District. SCS provides assistance to Grady under the Great Plains Conservation Program, a program created to help farmers and ranchers in the drought-prone Great Plains to protect their light and fragile soils from erosion and to stabilize production. Under the terms of a 10-year contract, Grady receives cost-sharing funds and technical assistance to install the conservation practices called for in his long-range plan.

The improved irrigation systems that Grady installed have boosted hay production and reduced water loss. He now produces more hay than his own herd needs and he sells the surplus to other ranchers. "You have to get more out of what resources you have," he said, "because expanding your operation is becoming more and more difficult with the increasing financial burden on agriculture."

Initially, Grady thought the cost-sharing funds provided by the Great Plains Program would be more important than the technical help. Now he feels the technical assistance is more important. "Most ranchers and farmers couldn't afford this type of help if they had to seek it through a private consultant," he said.

Matthew J. Ricketts,
soil conservationist, SCS, Helena, Mont.

Irrigation Associations Co-Sponsor Conference and Exposition

An irrigation industry conference and exposition will be held in San Antonio, Tex., December 7–10, 1986. More than 400 exhibitors will greet over 3,500 visitors from more than 50 countries during the 4-day event, which is being co-sponsored by the Irrigation Association, the Texas Turf Irrigation Association, and the Mexican Irrigation Association.

Technical sessions will cover a wide variety of irrigation topics in both agricultural and turf management. Irrigation Association sessions will deal with irrigation scheduling, drip/trickle variations, landscape irrigation, surface irrigation variations, mechanical sprinkler systems, and export market opportunities and procedures. Plans are to translate these sessions into Spanish.

The Irrigation Association will hold two certification examinations for system designers during the San Antonio show. These rigorous tests are part of the Irrigation Association's continuing effort to recognize both turf and agricultural system designers as professionals in the irrigation industry. A Level II examination is set for December 7, and a Level III exam will be held on December 10.

For more information contact the Irrigation Association, 1911 North Fort Myer Drive, Suite 1009, Arlington, Va. 22209, or telephone (703) 524-1200.

Seed Corn Growers Concerned About Wind Erosion

Several seed corn companies in the southwest corner of Michigan's lower peninsula recently joined forces with a conservation district in the fight against wind erosion. Together, the seed corn companies and the St. Joseph County Soil Conservation District are developing erosion-control systems suitable for the production of seed corn on the coarse-textured soils of St. Joseph County.

Wind erosion is not a new problem in the county. Controlling wind erosion was the principal reason for establishing the conservation district 38 years ago. Steady progress had been made until, in recent years, the large sizes of the fields, wide use of clean tillage systems, and lack of crop rotations helped make the wind erosion problem as serious as ever. The Soil Conservation Service estimates that the average soil loss in the county is about 7 tons per acre per year, about two-thirds of which is caused by wind erosion.

About 30,000 acres of the county is in seed corn production. When district officials discussed the problem with the seed corn growers, they learned that the growers were also concerned about wind erosion. Winds that cause erosion also tear and shread leaf tips, and windblown soil particles scour the waxy surface from young leaves. This damage often slows growth, which upsets pollination by reducing the number of days when fertilization can be achieved.

In the spring of 1985, with strong support and financial assistance from the companies that buy the seed corn from the growers, the district launched the Special Erosion Control Project to monitor the wind erosion and evaluate crop responses to different types of tillage under local conditions. Over the next 3 to 4 years, the district hopes to demonstrate the effectiveness of conservation tillage—compared to conventional clean tillage—in reducing wind erosion on fields used for seed corn production.

Under most conditions, conservation tillage works well for corn. It leaves crop residue that protects the soil from erosion and helps maintain soil moisture. The seed corn growers in St. Joseph County, however, have been reluctant to switch from conventional clean tillage to conservation tillage because of their concern that the crop residue might increase insect or disease damage.

As part of the project, the district hired a technician who is monitoring 2,665 acres in 22 different fields of seed corn. In addition to collecting information on all aspects of seed corn production that might be affected by conservation tillage, the technician is conducting an in-depth survey of the growers involved. SCS is providing technical assistance.

After the first year of the study, there was no difference in insect or disease damage as a result of conservation tillage. Grower acceptance of the project has been very good; all of the growers involved in the project have requested the district to continue testing the various systems. It appears that the district will be able to identify and develop effective wind erosion control systems that will be readily accepted and adopted by the county's seed corn growers.

Alan G. Herceg,
district conservationist, SCS, Centreville, Mich.

In St. Joseph County, Mich., severe wind erosion fills road ditches with soil and causes other off-site problems. This road ditch was filled during a single windstorm.

Conservation Education

Annual Land, Pasture, and Range Judging Contest Held in Oklahoma

The 35th Annual Land, Pasture, and Range Judging Contest held near Oklahoma City, Okla., April 30–May 1, attracted nearly 900 contestants and coaches from 32 States. The 62 award winners came from 13 different States. The contest was held at historic Fort Reno, a one-time cavalry post.

The contest was divided into three judging events: land judging, pasture and range judging, and homesite evaluation. Each event had three divisions: 4–H and Future Farmers of America (FFA), competing both as teams and individuals; and adults. Contestants evaluated topsoil, subsoil, slopes, and other characteristics, and recommended treatment to improve the land's adaptability for certain purposes.

Trophies were presented to Barbour County, W. Va., 4–H, and Cuba City, Wis., FFA teams in the land judging division. In the pasture and range divisions, the Binger, Okla., 4–H and Snyder, Tex., FFA teams took top honors. The Wabash, Ind., 4–H and Southwood, Ind., FFA teams won in the homesite division.

Top individual winners in the land judging division were Charles Metcalf, Richmond, Ky., adult division; Mike Strodtman, Bucklin, Kans., 4–H division; and Grant Beadles, Thomas, Okla., FFA division. Pasture and range division winners were James Henderson, Snyder, Tex., FFA division; Ali Tilley, Binger, Okla., 4–H division; and Wendell Fenton, Muskogee, Okla., adult division. Homesite division winners were: Titus Filbrun, Carroll County, Ind., FFA division; Sam Truss, Wabash County, Ind., 4–H division; and Craig Ellis, Trenton, Tenn., adult division.

Several agencies and groups helped with the contest, including people from the Oklahoma 4–H, FFA, the Soil Conservation Service, Oklahoma State University, and many other agricultural organizations.

This year's annual honoree was Verlin Hart. Hart has worked on the contest's tabulating committee for the past 13 years, serving as chairman for the past 5 years. Over the years, he has helped to tally approximately 65,000 contestant scorecards. Hart is an agricultural mechanics specialist and district supervisor for the Oklahoma State Department of Vocational and Technical Education.

Over 900 people attended the awards banquet in Oklahoma City on May 1. More than 200 awards of cash, trophies, and medals were given by the Farm Credit Services, serving Oklahoma, Kansas, Colorado, and New Mexico.

F. Dwain Phillips,
public affairs specialist, SCS, Stillwater, Okla.

In a soil pit, land judging contestants evaluate the topsoil, subsoil, texture, and other factors.

Landfests in Oregon

The Wallowa Soil and Water Conservation District in northeastern Oregon sponsors annual 1-day festivals to increase the public's understanding of the district's conservation programs. These festivals, which are called "landfests," feature speakers, conservation minitours, radio interviews, displays, food, entertainment, and awards programs.

Wallowa County is a scenic county, surrounded by mountains. Agriculture is the main industry. The citizens are concerned about conservation, and many diversified groups cooperate in the festival.

Last year, for example, the Cow Belles and the Wheat Grower's League jointly sponsored a hamburger stand and sold hamburgers for 11 cents each, which represented the farmer's share of the usual hamburger price. The theme for the festival was "Cooperation for Conservation," and it was attended by more than 500 persons.

The district started "Landfest" 3 years ago in part to promote no-till. It has been promoting no-till for several years and now claims the title of "The No-Till Capital of Oregon" with little argument. A dumptruck load of soil was displayed at last year's festival to show how much more soil is lost on an acre of a clean-tilled field than on an acre of a no-till field.

Early in its no-till campaign, the district purchased a no-till drill for use by area farmers. The program was so successful that the district finally sold the drill to avoid competing with local farmers whose success with no-till had led them to buy their own no-till drills, which they use for themselves and also rent to others.

The landfests are held in May. This year's featured a display contest.

Shirley Boothby,
retired public affairs specialist, SCS, Portland, Oreg.

Helping Teachers to Teach Soil and Water Conservation

Walk into an elementary school classroom with a golden eagle and you'll have every student's attention. Walk into that same classroom with a shovelful of soil and you'll have to work a little harder.

Children easily relate to wildlife. Each species is unique and fun to study. Water, too, stimulates a lot of interest. Children play in water, and many swim, fish, or boat in it. But to most children soil is all around, always there, and all looks the same.

Kenneth Rose, area conservationist with the Soil Conservation Service in Hutchinson, Kans., saw a challenge in this situation. He was convinced that the subject of soil and related topics could be made easier to understand for teachers and more interesting for students.

After checking with other SCS employees in Kansas and finding that many shared his concern, Rose formed a committee to study the problem. The committee included a district conservationist, an area resource conservationist, a resource conservation and development coordinator, and the State biologist.

The committee was assisted by Twyla Sherman, associate professor for instruction at Wichita State University (WSU). Sherman and her husband own a farm and understand the need for conservation. In her work with student teachers, she emphasizes resource conservation.

The committee agreed that action was needed in two areas. First, SCS district conservationists should develop more confidence in talking to teachers. The committee felt that SCS field staffs are generally inexperienced in working with teachers in a school setting. Second, the committee recommended that SCS provide teachers with an easy-to-use guide for teaching soil and water conservation.

"Hands-on activities are needed to sell soil and water conservation to teachers," Sherman told a workshop for SCS district conservationists in south-central Kansas. She suggested that, in demonstrating the activities, the conservationists talk to teachers as students. Most teachers are accustomed to this approach in their in-service training meetings. She also emphasized the need to avoid using too many technical terms.

For the teacher's guide, the committee prepared a 78-page booklet entitled "Conserving Our Soil Resources." This booklet, published by the SCS State office in 1985, presents soil information in the form of lesson plans and classroom activities. Copies of the booklet are provided to teachers at in-service training workshops conducted across the State by district conservationists trained by Richard Hager, SCS State biologist.

The booklet is designed for kindergarten through the sixth grade and describes activities that integrate math, art, music, and social science into conservation education. Sources for the material include a North Dakota teaching manual and two SCS publications, "Conserving Soil" and "Teaching Soil and Water Conservation, a Classroom Field Guide."

There are three major sections in the Kansas booklet. One section deals with soil and how it is formed, one covers soil erosion, and one deals with how soil affects our lives. A fourth section on water conservation is planned.

The booklet begins with a demonstration to answer the question "How much soil is there on the earth to use for growing food?" The demonstration uses an apple to represent the Earth. First, the apple is sliced into fourths, three of which are discarded, as they represent water areas. The last slice is divided in half. One half is discarded as uninhabited deserts, swamps, and arctic areas. The remaining piece is divided into fourths. Three of these pieces are discarded because they represent land that is too rocky, too wet, too hot, or too poor for crop production. The section that is left is one-thirty-second of the original apple. This section is peeled, and the peeling represents the thin layer of soil that is available for producing all of the world's food crops.

According to Rose, this demonstration is proving to be a popular and effective way of getting students to think about soil.

Terry Buettgenbach,
area resource conservationist, SCS, Hutchinson, Kans.

New USDA Program Helps to Put Ag in the Classroom

Ag in the Classroom is a U.S. Department of Agriculture (USDA) program designed to help students learn about agriculture and become citizens who support wise agricultural policies. Ag in the Classroom aims at helping educators to teach more about the source of our food and fiber and the role of agriculture in the total economy and society. Emphasis is on incorporating the following concepts into language, math, science, social studies, art, and other subjects:

- Agriculture issues or events as major influences in human history from making possible the first settled societies to current world food issues.
- What grows where and why.
- How technology and specialization have changed American agriculture in the last 100 years.
- How the agriculture sector works and the interrelationship of U.S. agriculture with the rest of the economy—supply and demand, setting prices, changing factors of production, farming as a business, and agribusiness.
- World food production and distribution and its relationship to American agriculture.
- Careers in agriculture now and in the future.
- Land use and conservation, biotechnology and agriculture, world food supplies, and other issues.

The Ag in the Classroom program is carried out in each State by a group composed of representatives from farm organizations and agribusiness groups, educators, and government officials. Each State is responsible for developing its own program. State groups may operate in different ways in different States depending on the State's need and interest.

USDA's function is to support these State groups. Specifically, the Department's role is to:

- Help States develop effective Ag in the Classroom programs.
- Serve as the central point for exchange of materials and information among the State programs.
- Encourage USDA agencies to assist in local Ag in the Classroom activities.
- Help the State groups assess their efforts to increase agricultural literacy within each State.
- Work closely with national organizations to promote an increased awareness of agriculture among the Nation's students.

USDA publishes a free bimonthly newsletter, *Ag in the Classroom Notes,* which covers program activities around the Nation. To be placed on the mailing list or for more information, contact Shirley Traxler, Room 232–W, U.S. Department of Agriculture, Washington, DC 20250; or telephone (202) 447–5727.

Indiana Conservation District Takes Conservation Education on the Road

The LaPorte County, Ind., Soil and Water Conservation District (SWCD) took its conservation education laboratory on the road in August 1985. The 14- by 7- by 8-foot traveling lab is a converted mobile field office trailer loaned to the SWCD by the Soil Conservation Service. Indiana's first mobile conservation education lab is available by reservation to farms, schools, campgrounds, churches, or any group interested in conservation education.

The Indiana State Soil and Water Conservation Committee provided Information and Demonstration Grant funds to equip the lab with materials and supplies. The lab's curriculum guide, developed by the SWCD and SCS staff, contains detailed outlines and activities for study units on soil, water, ecology, forestry, wildlife, birds, insects, plant life, and weather. The curriculum emphasizes the wise use of natural resources and interrelationships among the air, soil, water, and plant and animal life.

Supplies include soil samplers, soil profile kits, woodland sticks, an increment borer, latex wildlife tracks, water dip nets, a mini-weather station, and a plant press. Charts, a small library, and a puppet theater are also in the trailer.

Educators who reserve the trailer receive the curriculum guide a week ahead of the mobile lab to enable them to choose and prepare for the activities they want to use with their group. SWCD staff members are available to help.

Valarie Blaschka, LaPorte County SWCD resource conservationist, said that future plans include training Purdue University education students in outdoor teaching techniques so they can accompany the lab to school sites and help teachers use the equipment and activities. "Outdoor learning reinforces lessons learned indoors," said Blaschka. "The mobile conservation education lab will help teachers incorporate hands-on outdoor learning experiences into their lessons."

Melvin Womack,
district conservationist, SCS, LaPorte, Ind.

Mary Cressel,
public affairs specialist, SCS, Indianapolis, Ind.

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Soil Conservation Service
P.O. Box 2890, Room 6202–S
Washington, DC 20013-2890

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New Publications

Cycles of Soil

by Frank J. Stevenson

Transformations caused by microorganisms have a profound effect on the ability of soils to provide food and fiber for the world's population. Of great importance is the cycling of carbon, nitrogen, phosphorus, sulfur, and the micronutrient cations. A knowledge of the various cycles and their interactions is essential for the intelligent use of soil as a medium for plant growth and for the rational use of natural and synthetic fertilizers.

This reference text is a comprehensive, single-volume treatment of the biochemical cycles in soil. It covers all major aspects of nutrient cycling, including fluxes with other ecosystems, biochemical pathways and transformations, gains and losses, chemical fixation reactions, and plant availability.

A broad range of timely topics is discussed, including: management of crop residues and maintenance of soil organic matter; use of soil for disposal of organic wastes; biological nitrogen fixation; denitrification; efficiency of fertilizer nitrogen use by plants; nitrates in food and water; chemistry and fate of phosphorus and sulfur; and behavior of trace elements.

This text may be used as a reference text for graduate and advanced undergraduate courses in soil microbiology and soil biochemistry. It may also be used as a reference for researchers in soil science, microbiology, sanitary engineering, environmental science, and other related disciplines.

Cycles of Soil is available for $54.95 from John Wiley & Sons, Inc., One Wiley Drive, Somerset, N.J. 08873.

Toward a More Sustainable Agriculture

by Raymond P. Poincelot

The author presents an overview of the agricultural system in the United States and its current status in relation to growth and the future. Poincelot develops three viewpoints: conditions that now exist in the system, goals that reflect issues of specific concern, and potential directions for realistic solutions in the future. Topics include: soil and water conservation, energy conservation, organic farming, and future technology.

Applications of research technology are suggested in the areas of tillage, irrigation, breeding of appropriate crops and animals, and increased support of the farm community through up-to-date technical education.

The 241-page book is available for $28.50 from AVI Publishing Company, 250 Post Road East, P.O. Box 831, Westport, Conn. 06881.

Potassium in Agriculture

Edited by Robert D. Munson

In *Potassium in Agriculture*, proceedings of an international symposium held in July 1985 in Atlanta, Ga., over 80 internationally recognized authorities discuss such topics as world reserves, sources, mining, refining, technology, marketing, and current and future use of potassium. Basic and practical aspects of potassium soil chemistry and potassium status of soils important to crop production are also discussed along with the fundamentals of potassium absorption by plants and its role in enzyme catalysis, photosynthesis, respiration, assimilate transport, and metabolism.

The interaction of potassium with diseases, other essential elements, varieties, and hybrids, and cultural and management practices is also discussed. Potassium in maximum economic yield systems is included along with potassium nutrition of major world crops.

The text may serve as a reference tool for researchers and educators alike.

This 1,223-page text is available for $58 from the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America Headquarters Office, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

Conserving Soil: Insights From Socioeconomic Research

Edited by Stephen B. Lovejoy
and Ted L. Napier

A national symposium, "Soil and Water Conservation: Implications of Social and Economic Research for Policy Development and Program Implementation," was held in June 1985 in Zion, Ill., to examine the state-of-the-art in socioeconomic research on soil conservation to determine why many farmers do not adopt erosion control practices. The symposium brought together a group of social scientists and others to discuss the commonalities of their research and design strategies for coordinating their research on many of the behavioral aspects of soil conservation.

The book presents the main issues addressed by the presenters at the symposium. It also presents the reactions of a select panel of conservation professionals and summaries of discussion-group sessions attended by symposium participants. While the audience represented a broad range of individuals from agriculture, most participants had some association with conservation programs.

This 155-page book is available for $8 from the Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021.

Mineral Classification of Soils

Edited by J.A. Kittrick

The result of two Soil Science Society of America symposia, this publication brings together the expertise of over 20 recognized authorities to examine the criteria and techniques for soil classification that are the foundation of mineralogy classes. It contains chapters addressing almost all aspects of soil minerals and the ways they affect soil taxonomy. Topics include redefinition of mineral classes, treatment of the problems associated with present mineral classes and control sections, and the establishment of criteria and classes for soils dominated by amorphous and poorly crystalline material, including low activity clays.

This 178-page text is available for $15 from the Soil Science Society of America and the American Society of Agronomy Headquarters Office, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1986—490-922/40007

7/8

November 1986 Volume 7, Number 8

Soil and Water Conservation News

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Soil Conservation Service

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN–0199–9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013–2890.

Subscriptions
Send subscription orders to:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

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From the SCS Chief

Helping Farmers Prepare for the Future

I know from personal experience and from many visits to local communities that there are high quality Soil Conservation Service and local conservation district officials throughout the United States.

I hope that every one of you will continue to strengthen your commitment to technical excellence and to caring and concern for farm and ranch families.

We need all of our best qualities—both technical and social—to carry out the spirit of the Food Security Act of 1985 in ways that respect the rights and needs of all producers.

The highly erodible land provisions of the Act will make it costly to farm without conservation for producers who ordinarily participate in several U.S. Department of Agriculture (USDA) farm programs and depend on that financial support, loans, or insurance protection.

The Conservation Reserve made possible by the Act will help many farmers to receive guaranteed income for 10 years, while gaining peace of mind that some of their most troublesome acres are well protected.

We need to help all farmers and ranchers understand the new options open to them, the possible financial effects of their decisions, and the close timetables. We also need to help them become aware of the resource trends in their county and State.

And then we need to step back and let producers weigh their choices.

If the decision is to become a conservation farmer, or at least to stop producing crops on erosion-prone fields, then let's proceed with good technical support as rapidly as we and our conservation district partners possibly can.

If the decision is "not now," we must respect the fact that there may be factors or needs that we don't understand or need to know. This is not a Federal land use bill, it is a vehicle for making USDA farm programs more consistent.

It is most important right now that we reach out to all producers, not just those we're used to working with or who already feel comfortable working with SCS and districts. They all need to hear about the new opportunities and possible new constraints.

Above all, be ready to help when asked.

Wilson Scaling

Cover: Maurice Davis, SCS area range conservationist, inspects grasses on improved rangeland near Mobridge in north central South Dakota. In the background is the Missouri River. (Photo by Tim McCabe, former photographer, SCS, Washington, DC.)

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

All programs of the U.S. Department of Agriculture are available to everyone without regard to race, color, national origin, sex, age, or handicap.

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USDA Accepts 5 Million More Acres into Conservation Reserve

On August 29, Deputy Secretary of Agriculture Peter C. Myers announced that the U.S. Department of Agriculture (USDA) had accepted more than 5 million additional acres of highly erodible cropland into the Conservation Reserve Program.

"We now have almost 9 million acres total from three signups," he said. "Our 5-year goal is to remove 40 to 45 million acres of highly erodible cropland from production for 10 years, and with this level of participation we feel we are well on our way to meeting that objective. It's obvious that more farmers have been seriously weighing the benefits of participating in the Conservation Reserve."

In this latest signup, more than 45,000 bids were submitted for almost 6.5 million acres. The accepted bids ranged up to $90 per acre with an average of $46.94 per acre.

Annual rental payments will compensate farmers for retiring highly erodible land from crop production. The amount of payment is determined by the bid per acre and the number of accepted acres.

Participants will also receive conservation payments of up to 50 percent of eligible costs of establishing trees and grass on the acreage placed in the Reserve. The conservation payments will partially reimburse farmers for the one-time cost of establishing required conservation practices on the cropland.

Myers said land entered into the Conservation Reserve, as directed by the Food Security Act of 1985, will be ineligible for farming for 10 years and must be planted with permanent vegetative cover. "This program will bring many benefits, including the enhancement of wildlife habitat," he said.

To date, farmland signups total almost 9 million acres. During the first signup period, March 3-14, USDA accepted bids to enter more than 800,000 acres on over 10,000 farms into the program. Bids on that signup ranged up to $90 per acre with an average of $41.82.

During the second period, more than 3 million acres on nearly 23,000 farms were accepted. Accepted bids in this period also ranged up to $90 per acre with an average of $44.23.

Additional signup periods for bidding will be announced.

USDA Looks at Information Needs for New Conservation Law

Farmers need more information on the conservation provisions of the Food Security Act of 1985. They need it quicker. And they need all U.S. Department of Agriculture (USDA) agencies to send the same basic facts.

These were the main points raised at a USDA interagency conference held in Washington, DC, September 17–19 to get feedback on USDA information work related to the Food Security Act of 1985 and develop information strategies.

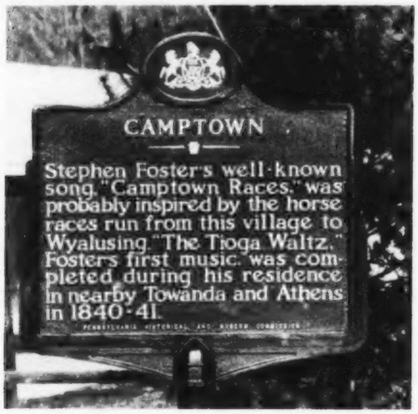
Conferees, who came from all levels of the Agricultural Stabilization and Conservation Service, Extension Service, Farmers Home Administration, Federal Crop Insurance Corporation, Forest Service, and Soil Conservation Service, as well as a number of private groups, proposed that USDA develop national information materials that State and local offices could use or adapt.

An interagency team of information and technical specialists will develop draft products, review the materials, and coordinate clearances. This should ensure that all agencies involved play an active role in developing information materials. Most importantly, it should lift the burden of producing information materials from State and field staffs, who will have as much work as they can handle serving the public.

Assistant Secretary for Natural Resources George S. Dunlop told the group that it is USDA's job to explain to farmers all the options that are available to them as they strive to comply with swampbuster, sodbuster, and conservation compliance. Dunlop also emphasized the need for closer cooperation than ever before among the USDA agencies involved.

The overall goal of these new initiatives, said Dunlop, is to ensure farmers' use of sound conservation systems to improve soil and water resources as they produce food and fiber.

Camptown Pulls Ahead in Race Against Streambank Erosion


CAMPTOWN
Stephen Foster's well-known song, "Camptown Races," was probably inspired by the horse races run from this village to Wyalusing. "The Tioga Waltz," Foster's first music, was completed during his residence in nearby Towanda and Athens in 1840-41.
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

Camptown may have been immortalized in a song—but a good part of it was saved by a streambank stabilization project.

For more than a century, the world has seen this small village in northern Pennsylvania as portrayed in Stephen Foster's lighthearted "Camptown Races." It was a place where the horses ran all night and all day, where you could go with your hat caved in and come back with a pocketful of tin, where you could bet your money on a bob-tail nag and somebody would bet on the bay.

The real Camptown is in Wyalusing Township in Bradford County, just south of the New York State line. When Foster lived in the county in the 1840's, horses were raced from village to village and maybe the Camptown ladies really did, as he wrote, sing about a racetrack 5 miles long. But in recent years the song has changed.

"When I came here in the spring of 1983, the phones were ringing off the hook with people complaining about streambank erosion threatening their properties," said John George, district conservationist for the Soil Conservation Service.

An old hand-laid stone wall that held Camp Creek in place in Camptown was rapidly deteriorating. The streambanks were eroding so badly that a playground, post office, residence, and telephone relay station were all in danger.

"Parents were worried because an 8-foot-high streambank had eroded back under the fence at the playground," said Bob Stevens, township supervisor. "The retaining wall had fallen in under the phone station, threatening its stability. At the post office, a concrete parking slab was so undermined it began to pull away from the road. We put old beams and anything else in to fill the opening as a temporary measure."

What was happening in Camptown—and the rest of Bradford County as well—is typical of upland hilly regions with steep valleys. Streams continually cut away banks trying to change channels, often endangering private residences and businesses and public bridges and roads. Property owners and local municipalities rarely have the financial and technical resources to deal with these problems.

To assess the seriousness of streambank erosion in the county, the Bradford County Conservation District conducted an inventory. In March of 1983, the district queried all 51 boroughs, towns, and townships in the county about streambank erosion problems, and about 75 percent responded with requests for assistance. During the spring and summer of 1983 the district inventoried and documented more than 50 sites, and within a year the district had received more than 200 calls for assistance.

There were a few surprises, however, when the district began studying criteria to determine which sites were eligible for existing State programs. Camp Creek in Camptown, for example, did not qualify for State assistance because of the existence of the old retaining wall, although the wall was rapidly losing its effectiveness. And, since the likelihood of obtaining funds from Federal and other sources did not appear promising, the district decided to form a special committee to find an alternative solution.

"We're a rural area and are known for our willingness to work together to get a job done," said Marilyn Bok, a county commissioner who chaired the committee. "This concept became the heart of our solution."

After much research, the committee proposed a program that would use rock-filled gabion basket retention walls. Although gabions are labor intensive, they were selected because workers and rock were readily available in the county and only small equipment was needed for installation. The result is an ongoing countywide streambank stabilization program that makes the best use of local resources.

Since the county and some of the municipalities had summer labor programs, the district secured free labor under the Job Partnership Training Act. SCS provided engineering assistance. Many of the municipalities were able to lend trucks and earthmoving equipment such as backhoes. The district helped to coordinate the work, assist with permit applications, and in some cases supervise projects.

During the first year of the program, the bank erosion problem at the park in Camptown was corrected with the placement of 34 gabion baskets at a cost of $3,000 for the materials. The following year, about the same number of baskets were installed to protect the relay station and post office.

"The conservation district crew did a great job," said Stevens. "They were down here so long we accepted them as locals. They were a great group of young men."

Another example of the program's success is in Ulster Township. After receiving district help the first year, Ulster required only technical aid in planning and implementing another project to be completed over a 2-year period.

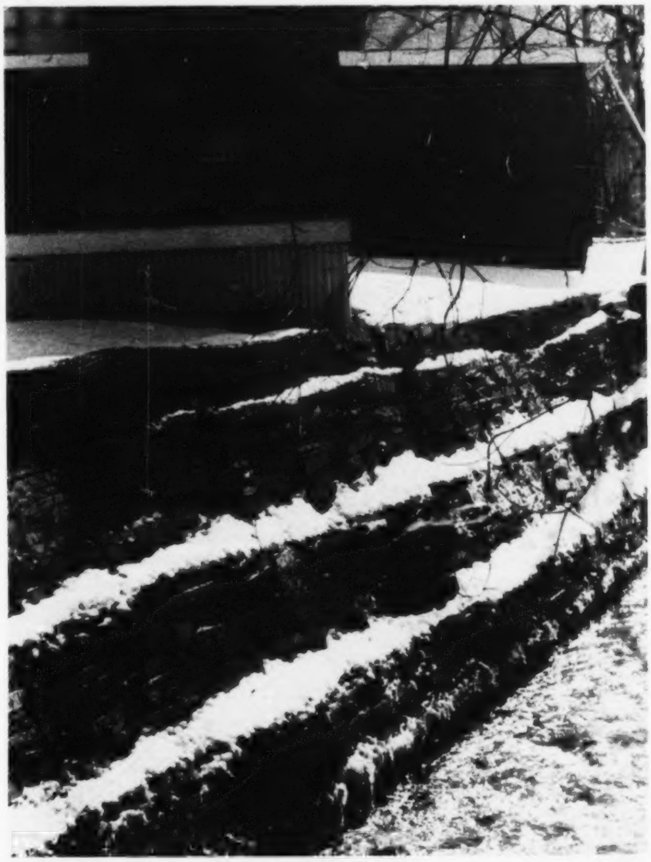
"We're pleased with the project," proclaimed Ira Haire, district chairman. "We run the program on a zero budget. We charge the property owner a $5 delivery fee for each basket and $50 for administration, which covers tools and workers' mileage."

Overall, more than 20 sites of hazardous streambank erosion identified in the original inventory have been corrected through this program, or other State and Federal programs for which the sites qualified.

"Part of the success was knowing what help was already available and referring people to the right agency," said Haire. "Then the conservation district found a way to help those who couldn't get help elsewhere. We were able to save local people 60 percent of the improvement costs by using local resources."

Stephen Foster would have taken that kind of money home in a tow-bag.

Michael W. Lovegreen,
district manager, Bradford County Conservation District, Towanda, Pa.



Streambank erosion had begun undermining the foundation of this telephone relay station (upper left of photo) along Camp Creek in Camptown, Pa. Now, a rock-filled gabion basket retention wall protects it and other buildings from further erosion.

Photos by Frederick E. Bubb, public affairs specialist, SCS, Harrisburg, Pa.

Illinois Takes New Approach to Resource Planning

In Mercer County's Donohue Run hydrologic unit, SWCD Board Chairman Pat McVeigh (left) and SWCD Resource Conservationist Bill Joseph discuss ways to keep the soil on this field and off the adjacent road. Sediment control is a high priority in Donohue Run's resource plan.

This subsurface drain line for a broad-based outlet terrace is one of many constructed in St. Clair County's Little Silver Creek hydrologic unit, where streamflooding and siltation caused by field runoff were identified as chief resource concerns. Observing construction of this drain line with a local contractor is Keith Donelson (right), SCS's water resources planning coordinator for Illinois.

"It makes good sense to plan *with* people rather than *for* them," says John Eckes, State conservationist for the Soil Conservation Service in Illinois. "People support plans that they are a part of."

This philosophy underlies resource planning throughout Illinois. Two years ago, the SCS staff, in cooperation with soil and water conservation districts (SWCD's), began a special effort in 14 pilot counties to involve local people more closely in the resource planning process.

The main difference in their new approach is focusing on planning by hydrologic unit instead of along county or conservation district boundaries. "Hydrologic unit" is just a fancy way of saying "watershed," explains Deputy State Conservationist Billy Milliken. "We don't say 'watershed' because we don't want people to confuse our resource planning process with the Public Law 83–566 Small Watershed Program."

Hydrologic units

The hydrologic units are subdivisions of the 51 river basins in the State. SCS has divided those basins into 500 subbasin units of approximately 250,000 acres. From these multicounty units, the soil and water conservation districts in each county have delineated hydrologic units of 10,000 to 40,000 acres in size. The delineations depended on such criteria as community and landowner priorities, number and extent of resource concerns, number of operating farms, and existing or potential conservation projects. Keeping the size of the unit to manageable proportions was important.

Planning committees

The conservation district board and the SCS district conservationist select a grassroots planning committee to work on resource planning in a hydrologic unit. Committee members are key people who represent a wide range of local interests, from agriculture to banking, industry, and government. Usually, six to eight people are on a planning committee. Says Ray Herman, State resource conservationist for SCS, "Involving more people through a planning committee allows us to look at the bigger picture and to look at more resource concerns than just soil erosion."

Planning committees do the following: identify important resource concerns, establish a technical advisory committee, keep the public informed of committee activities through newsletters and media coverage, authorize resource inventories and evaluations, develop alternative resource strategies for the plans and present them at public meetings, and determine a final plan.

Field experiences

SCS field people working with hydrologic units in pilot counties have found that this program delivery system broadens their perspective of local resource concerns. It also helps them to work more efficiently.

SCS District Conservationist Gary Fak in McLean County found that once a good cross-section of leaders from cities, rural areas, and various institutions got together to represent a hydrologic unit, they took on a good deal of the planning workload.

Working with six hydrologic units in the planning stage, Fak discovered that the problems he perceived were not necessarily the problems perceived by the committees. The planning committees have him looking beyond the scope of traditional SCS issues, such as soil erosion and water quality, and into socioeconomic problems that he had not previously considered.

More than ever before, Fak and the district board are working with urban people and their concerns. People in hydrologic units in areas subject to intense urban sprawl and industrialization, especially around Bloomington, are trying to assess land capability and control erosion, sedimentation, and stormwater runoff.

For predominantly agricultural Mercer County, planning by hydrologic unit is paying dividends, particularly in citizen awareness of the off-site benefits of soil and water conservation. In two pilot watersheds, Donohue Run and Douglas Creek, for example, SCS District Conservationist Melissa Westerlund and her staff have seen a marked reduction in sediment accumulation in streams and roadways. They credit conservation measures that landowners applied after a road commissioner told the planning committee about the high cost of removing sediment.

"Community awareness—neighbors working together" is the real advantage of hydrologic unit planning in the opinion of Bill Joseph, SWCD resource conservationist in Mercer County. "Time and time again we see people work together at the resource planning meeting, talking about a common creek and a common problem."

Westerlund's staff find that planning by hydrologic unit is improving their operations. SCS Conservation Technician Richard Bemis notes, "You can concentrate your effort, money, and transportation in one area and get a lot of work done in a short time. Planning by hydrologic unit does away with the shotgun approach, which gets a lot of conservation on the land, but makes it difficult to see the results."

St. Clair County's SCS District Conservationist, John Harryman, recalls that in the mid-1970's the district board realized conservation programs "cannot be *our* programs. They have to be the *people's* programs, and we are going to have to go from the grassroots up." According to Harryman, the district was also "quick to realize that SCS and the soil and water conservation districts cannot be all things to all people at all times." Other agencies have to be brought into the planning process.

Local planning committees have helped solve flooding and road siltation problems in St. Clair County's Ash-Loop Creek Watershed, which supports agriculture, an airbase, and urban development. By listening to the concerns of farmers and urban and military leaders, SCS and the Illinois State Department of Transportation were able to design remedies that were supported locally.

In the highly erodible bluffs of western St. Clair County, the district is helping to establish local planning groups representing the many part-time farmers not accustomed to working with conservation agencies. These groups are working with SCS, other Federal and State agencies, and local equipment and chemical dealers to raise local awareness of nonmechanical practices such as no-till.

Said Harryman, "Our time is better used; we're putting fewer miles on the vehicles per acre of ground treated. And we're able to generally get things done quicker, cheaper, and more efficiently. The contractor can work in a given area and not move equipment all around. If you are terracing, you can get materials quicker because the distributor can dump them all in one spot rather than truck loads all over."

Computer automation

With the adoption of program delivery by hydrologic unit, microcomputers are among the most critical needs of SCS field offices in Illinois. Eventually, field offices will have automated case files to generate progress reports by hydrologic unit, watershed, or river basin.

Keith Donelson, SCS's water resources planning coordinator for Illinois, reports that SCS, the University of Illinois, and State agencies are trying to develop models that will determine the off-site and onsite benefits of conservation practices and systems in a specific hydrologic unit. The models are being designed to operate on the FOCAS (Field Office Communication and Automation System) equipment used agency wide.

Conservation Briefs

The future
Resource planning by hydrologic unit has a strong future. It has the support of the Association of Illinois Soil and Water Conservation Districts and many Federal and State agencies. Its benefits for all participants are clear:

- In the hydrologic unit, people meet on their own ground to address their own concerns. They get to hear about a variety of possible solutions, not just a single government program.
- The soil and water conservation district broadens its base of key people who understand local needs and who support conservation. It also gains recognition as the focal point of resource planning.
- SCS benefits from the operating efficiency of the resource planning process and from the data base of onsite and offsite benefits of conservation. SCS also gains the chance to show that it can coordinate its efforts with local people to address a wide variety of resource concerns besides controlling soil erosion.

SCS's Billy Milliken considers resource planning by hydrologic unit especially important in an era of Federal spending cuts: "We simply cannot get the job done by knocking on doors and dealing one-on-one. We have to get more people involved. The more people we contact, with or without cost sharing, the more people there'll be who will apply conservation."

David L. Moffitt,
editor, Public Information Staff, SCS, Washington, DC

Range Improvements In Montana Foothills

The Great Plains Conservation Program (GPCP) is bringing changes to the foothills of Montana's Highwood Mountains. Rancher Ken Maki, for example, has greatly improved his rangeland northeast of Belt through a GPCP contract with the Soil Conservation Service.

Under the GPCP contract, SCS provides Maki with technical and financial assistance through the Cascade County Conservation District to implement a conservation plan that he and SCS worked out together. The technical assistance is critical, Maki said, because his ranch is at a high elevation (between 4,500 and 5,000 feet) that requires special attention to site and species suitability.

Since entering into the contract in 1978, Maki has developed four springs, installed more than 3 miles of pipeline and nine water troughs, put in nearly 3½ miles of cross fences dividing 6 pastures into 12, and reestablished 80 acres of hayland. Thus far he has emphasized improving his range rather than trying to increase cattle numbers, but he expects to eventually be able to increase that by 10 percent.

"The Great Plains contract has allowed me to balance out my grazing," he said, "eliminating overgrazing and undergrazing." He said the range improvements have already made proper grazing rotation possible and attracted more game animals.

Maki operates under a rest-rotation grazing system. He tries not to let the cattle graze the same field at the same time of year, year after year, and he tries to rest one or two fields each year. In areas where the range condition is not as good as he would like, he tries to limit grazing to one short period a year.

To reduce the grazing pressure on his native range, Maki plans to develop 25 acres of tame pasture for early spring grazing. He seeded 9 acres of the tame pasture in the spring of 1986, and, although damaged by grasshoppers, this planting still produced an excellent stand.

Maki said his GPCP contract makes it easier for him to plan several years ahead. The contract requires long-term planning, but is flexible enough so that planned items can be rescheduled and new conservation practices added if needed.

Another feature Maki likes about the contract is being able to obtain technical assistance and oversee or do the jobs himself.

In 1984, the Cascade County Conservation District named Maki Cooperator of the Year. "The Great Plains contract has helped to improve the productivity of our land," Maki said, "while preserving the land for future generations and improving wildlife habitat."

Farmers and ranchers in 519 counties in 10 States are eligible to participate in the Great Plains Conservation Program. Contracts run from 3 to 10 years and can provide up to $35,000 per contract in cost-sharing assistance.

Wendell Martinell,
district conservationist, SCS, Great Falls, Mont.

Cattle Help Stamp Out Leafy Spurge

Cattle might prove more cost-effective than chemicals for controlling leafy spurge.

Gene Foss used to spend about $32 per acre per year for the chemical control of leafy spurge on his ranch south of Culbertson, Mont. His cows are now stamping this weed out for free.

Foss' idea for using cattle instead of chemicals goes back to when he first noticed forage grasses growing in tire tracks across a patch of spurge. Later he observed that there was no leafy spurge in his cattle trap, where cattle are concentrated for 2 or 3 days a year, but that it dominated the plant community on the other side of the fence.

These observations led the rancher to conclude that leafy spurge cannot tolerate physical impact—like that caused by the weight of a vehicle or cow. If leafy spurge cannot tolerate physical damage, Foss reasoned, then he ought to be able to control it that way.

As a long-time cooperator with the Richland County Conservation District, Foss was in the process of implementing a new time-control grazing program. This provided a perfect opportunity to test his idea about controlling leafy spurge.

He divided 8,400 acres into 21 pastures, grouped his cattle into one herd, and began moving them through the pastures in a planned manner. He then added more cattle to his herd until the density was increased to at least 2 cows per acre.

The grazing cows, however, were careful where they placed their feet and caused little damage to the leafy spurge. "In the first grazing periods," Foss said, "the cattle didn't do the physical damage that I wanted to the spurge."

Foss then placed mineral supplements in the leafy spurge patches to stimulate herding behavior. In getting to the supplements, the cattle trampled the spurge plants, breaking off their stems and killing them. As a result, grass seedlings soon became established in areas previously infested with the spurge.

This effort at weed control is part of a holistic resource management plan that Foss adopted in March of 1985. According to the plan, Foss times the grazing in his pastures according to the plant growth rate, the quality of the forage, and the number of total pastures, which he plans to increase to 40 by 1987. He rests each pasture for 30 to 90 days, depending on the growth rate of the plants, until it has recovered from the initial grazing. This procedure allows for animal impact on the land and reduces the stress of grazing on the forage plants.

Foss believes that the repeated animal impact built into the plan will eliminate spurge's dominance on his ranch and allow desirable forage plants to increase. His progress has generated considerable interest among other ranchers in the area and the Soil Conservation Service.

"Many ranchers have successfully controlled brush species this way," said Arnold Norman, area resource conservationist for SCS. "Foss seems to have a good start at controlling his leafy spurge."

Mark Parman,
soil conservationist, SCS, Circle, Mont.

SCS to Revise Guidelines on Designing Open Channels

New developments in geomorphology will help the Soil Conservation Service to more effectively deal with channel erosion—and save landowners money.

Geomorphology is the study of the way landscapes evolve. By studying the different stages of landforms and stream systems, geomorphologists can tell a lot about a landscape's past and make many predictions about its future. SCS engineers are finding that they can use this geomorphic approach to determine the most effective locations to apply conservation measures to open channels.

Open channels are waterways commonly used for flood protection, drainage, irrigation, diversion of water to control erosion and sedimentation, and recreation. SCS provides technical assistance to landowners in the design and planning of floodways and other open channels where channel erosion is of primary concern.

The conventional engineering approach to stream channel erosion concentrates on present stream conditions, such as water volume and velocity, rate of sediment deposition, and soil properties of the streambanks. Once these conditions are known, engineers design structures to reduce erosion and maintain channel boundaries. This rigid-boundary approach is particularly appropriate in urban or built-up areas where stream boundary changes or flooding would cause extensive damage.

Most rural landscapes, however, contain landforms and stream systems that are in a state of slow transition. They may be eroding, filling, stable, healing, or beginning to become unstable. The goal of the geomorphic approach is to bring the channel into a state of dynamic equilibrium with the landscape. This means that erosion and sediment deposition are both anticipated and tolerated within certain limits. Rather than trying to stop all boundary changes and creating a situation where any change would be a failure, the geomorphic approach tries to keep changes small and in harmony with the evolving landscape.

Researchers at Colorado State University demonstrated several years ago that geomorphic principles can be used to predict stream erosion and deposition in arid and semiarid areas. Encouraged by this research, SCS joined with the U.S. Department of Agriculture's Agricultural Research Service and the U.S. Army Corps of Engineers to test the principles in managing the more humid Yazoo River Basin in Mississippi. Additional field trials were later made in the Muddy Fork Watershed of Silver Creek in Indiana. These tests have proven so successful that SCS is incorporating the geomorphic approach in a revision of its engineering manual on the design of open channels (Technical Release No. 25).

The geomorphic approach involves a thorough observation of the entire landscape to determine which stream segments are most subject to change, which are eroding but likely to heal, and which are in dynamic equilibrium. Under this approach, the best location for a conservation measure may not be where erosion is currently the most active.

Compared to the rigid-boundary approach, the geomorphic approach requires considerably more time for geologic inventorying and more hydrologic data. Landowners and project sponsors must make more decisions on how much change they are willing to accept, but can often realize dramatic savings in construction costs because the geomorphic approach usually results in fewer—but more strategically located—structures.

By combining the two approaches, SCS hopes to produce a method that is better than either in its pure form. In their pure forms, the geomorphic approach could result in letting a channel recklessly adjust on its own, and the rigid-boundary approach could result in a frustrating effort at total structural control. The combined approach will integrate the two and use geomorphic data on channel evolution and response to aid in the selection of the most effective structure types, locations, and times of installation. It will guard against extremes.

Geomorphic data will be used by SCS engineers in nearly all of the work they perform on open channels. This includes: (1) predicting the impacts of channel and watershed changes, (2) planning and designing channel changes, (3) planning and designing remedial work on channels, (4) predicting rates of gully and stream erosion, and (5) predicting the effect of stream and gully erosion on areas influenced by sediment.

It is expected that channel geomorphology studies will soon be as valuable for planning stream modifications as soil surveys are for conservation planning or foundation geologic investigations and soil mechanics tests are for structure foundation treatment and design.

C. Donald Clarke,
national sedimentation geologist,
SCS, Washington, DC

SCS Provides Emergency Flood Assistance in New Jersey

During 1984, New Jersey experienced one of the wettest and stormiest springs in its history. Two storms hit within 60 days. The first storm occurred April 5 and 6, when nearly 6 inches of rain fell on already saturated ground. The result was heavy runoff and severe flooding. Thousands of people evacuated their homes, and receding floodwaters revealed severely eroded streambanks that threatened houses and roads.

In the community of Pompton Lakes, the Ramapo River scoured its 12-foot banks to within 3 feet of one residence. Property damage along one part of the river was estimated at close to $1 billion. This damage was compounded by a second recordbreaking storm that swept across the area over the Memorial Day weekend.

Local leaders contacted the Federal Emergency Management Agency (FEMA) for assistance. FEMA coordinates emergency assistance following floods and other disasters. The Soil Conservation Service, in cooperation with FEMA, provides technical and financial assistance whenever fire, flood, or other natural disaster causes sudden damage in a watershed. To safeguard lives and property, SCS undertakes emergency measures to retard runoff and reduce soil erosion and sedimentation.

SCS responded quickly to FEMA's and the community's request for emergency assistance by contracting for and supervising the installation of more than 1,000 cubic yards of riprap to stabilize the banks of the Ramapo River. Another 2,000 cubic yards of riprap was applied to stabilize streambanks along the Pequannock River. Four sites along Foulertons Brook, which runs through the town of Roseland, were stabilized with 760 cubic yards of gabions.

Nancy Paolini, SCS project inspector for the work along the Pequannock River, said, "It's not easy to picture erosion occurring at such an alarming rate that some people lost 15 feet of their backyards." The banks at this location were stabilized with riprap, and 4-foot diameter boulders were placed in some areas.

As a result of the floods of 1984, many people in the northeastern part of New Jersey are more aware than ever of the natural forces at work in the streams that flow through their cities and towns. They are also more aware of the assistance provided by the U.S. Department of Agriculture—through SCS and FEMA—in recovering from flood damage and minimizing its recurrence.

Barbara L. Maus,
public affairs specialist, SCS, Somerset, N.J.

Iowa Study Shows High Off-Site Costs of Soil Erosion

"We've always known that soil erosion on farms causes problems downstream," said Mike Nethery, Soil Conservation Service State conservationist in Des Moines, Iowa, "but for the first time we've estimated the costs of specific types of damage, and they're very high."

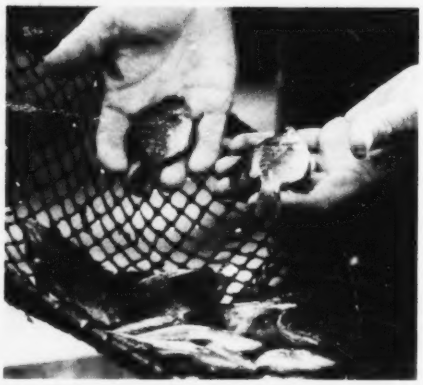
A recent Iowa study, "Off-Site Costs of Erosion," lists the total annual damage from sedimentation at more than $32 million: $8 million in cleaning out road ditches; more than $13 million in cleaning out blocked drainageways on farmland; $10 million in the loss of recreation use of streams and lakes; and $1 million in additional treatment of municipal water supplies.

SCS heads the interagency team that began work on the study in 1985, using special Soil and Water Resources Conservation Act funds. The Center for Agricultural and Rural Development (CARD) at Iowa State University gathered cost data on sediment damage from county engineers, State agencies, city water treatment officials, and others.

"Those cost estimates tell only part of the story," Nethery said. "They're current annual costs to correct the worst off-site damages caused by soil erosion, not to correct all of them. Correcting all of the problems would cost about double the amount being spent now.

"The $32 million of mostly public funds that Iowa is spending to correct only some of the damage caused by off-site soil erosion is more than twice what is being spent in Federal, State, and county cost-share funds each year to prevent soil erosion in the first place."

Lynn Betts,
public affairs specialist, SCS, Des Moines, Iowa



Top: In Iowa, a work crew removes sediment from eroding cropland from road ditches.
Left: Sediment and accompanying nutrients from off-site erosion enter Union Grove Lake in central Iowa boosting algae growth and reducing the lake's water-holding capacity and its value for recreation.
Above: Excessive algae growth in Union Grove Lake leads to stunted growth in panfish.

Control the Splash

The raindrop splash on bare earth—the beginning of soil erosion and sediment problems—will be featured in television public service announcements across the Nation this winter.

"Control the splash and you ease sediment problems in our lakes and streams" is the message of a series of 30-, 20-, and 10-second spots. The spots were distributed to Soil Conservation Service State offices in late September.

The Iowa SCS State office produced the television spots as part of an effort to publicize the off-site costs of soil erosion. The U.S. Department of Agriculture's Video and Film Unit and the SCS National Headquarters Public Information Staff helped film, edit, and distribute the spots.

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New Publications

Conservation Districts into the 1990's

by the National Association of Conservation Districts

In the mid-1960's, the National Association of Conservation Districts (NACD) appointed a special committee on district outlook to examine districts' accomplishments, their authorities, and their potential to address the resource needs in the future. This is the third report issued by that committee.

Based on surveys of State conservation agencies, conservation districts, and district officials, the report outlines committee recommendations for future action by the Nation's nearly 3,000 soil and water conservation districts.

In the report, the committee recommends that districts: develop work plans based on high priority problems, taking manpower and funding into account; actively recruit new conservation cooperators; establish comprehensive resource conservation programs; arrange for State soil conservation agencies to provide leadership training for district officials; establish a legislative network to strengthen district programs; and seek new sources of funding for district programs. Further, the report recommends that districts should work actively with local schools to develop conservation education curricula and should encourage participation of minority groups, women, and young people.

Single copies are available from the NACD Service Department, P.O. Box 855, League City, Tex. 77573.

Lands of Brighter Destiny: The Public Lands of the American West

by Elizabeth Darby Junkin

Millions of acres of land in the western United States (national parks, forests, wilderness, and range) is public land—it belongs to all citizens. In this book, the author first reviews the history of the laws and the Federal agencies that control these lands. Next, the author interviews residents and those political figures whose influence and dreams are the philosophic roots of future decisions about these western lands. In conclusion, the author believes that an agreement must be reached on a land ethic for the future management of these western public lands.

This book is available for $13.95 from Fulcrum, Inc., 350 Indiana Street, Suite 510, Golden, Colo. 80401.

Hazardous Waste Management: Reducing the Risk

by Benjamin A. Goldman,
James A. Hulme,
and Cameron Johnson

This report on a 2-year study by the Council on Economic Priorities (CEP) rates the performance of 10 toxic waste disposal sites. The report cites cases where hazardous waste has been inadequately handled. CEP's motives are to help government officials better protect our population, to help toxic waste generators determine where they might dispose of toxic wastes more safely, and to help the waste disposal companies know what constitutes a good job.

CEP is an independent, nonprofit, public research organization founded in 1969. CEP studies the environment, national security, and corporate social responsibility. It is funded by individual members and foundations.

Single copies of this book are available for $34.95 (plus $2.50 postage and handling), from Island Press, Dept. B, Box 53406, Washington, DC 20009.

Two newsletters, *Busting the Shell Game* by Benjamin Goldman and *Management is the Key* by Cameron Johnson, are available from CEP without charge.

Robots of Cave Alpha: Creating a Livable Land

by the Soil Conservation Society of America

One in a series of educational cartoon booklets published by the Soil Conservation Society of America, *Robots of Cave Alpha: Creating a Livable Land,* emphasizes that people must be knowledgeable about the environment, about who makes environmental management decisions, and about how those decisions are made. The booklet, designed for the upper elementary grades, and accompanying teacher's guide is written to help young people understand how environmental management decisions are made and what individuals, small groups, and governments can do to influence the quality of life for citizens.

The adventure story introduces young people to current environmental issues, such as urban beautification and restoration, farmland preservation, water quality, soil erosion, air pollution, and the reclamation of mined land.

The booklet's story line finds three children stumbling onto a cave filled with robots and the world's smartest computer, which is designed to help rebuild a quality life on Earth after a worldwide disaster. Questioned by the robots, the children learn that rebuilding a quality environment requires many difficult and conflicting decisions.

The accompanying teacher's guide includes background information, 4 activity masters, and 15 alternative activities designed to help teachers tailor the lesson to meet the needs of the students.

Single copies of the cartoon booklet are available for 75 cents, and single copies of the teacher's guide are $2, from the Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021. Substantial discounts are available on quantity purchases of both the booklet and teacher's guide.

Interaction of Soil Minerals with Natural Organics and Microbes

Edited by P.M. Huang
and M. Schnitzer

Written by more than 30 international specialists, this publication identifies present and future research needs and attempts to stimulate new research leading to further integration of knowledge about soil minerals, natural organics, and microbes and their effects on soil development, agricultural production, and environmental protection.

This book should prove to be a valuable reference for students, scientists, researchers, and instructors in the soil and environmental sciences.

This 606-page book (Special Publication Number 17) is available for $30 from Soil Science Society of America, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

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December 1986 Volume 7, Number 9

Soil and Water Conservation News

United States Department of Agriculture
Soil Conservation Service

Swampbuster—Protecting Wetlands

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Soil and Water Conservation News is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil and Water Conservation News* has been approved by the Director of the Office of Management and Budget through January 31, 1987. *Soil and Water Conservation News* (ISSN-0199-9060) is published 12 times a year. Postage paid at Washington, DC.

Magazine inquiries
Send inquiries to: The Editor, *Soil and Water Conservation News*, Public Information Staff, Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, DC 20013-2890.

Subscriptions
Send subscription orders to:
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Comments:

From the
SCS Chief

A New Way to Protect Wetlands: Swampbuster

One provision of the Food Security Act of 1985 brings some much needed consistency to USDA programs. The section, titled wetland conservation in the Act, is often referred to as "swampbuster."

In essence, it means that any farmer who converts wetland after December 23, 1985, and produces an agricultural commodity on it will no longer be eligible for many U.S. Department of Agriculture farm programs.

Before swampbuster, farmers could include converted wetlands as part of their base acreage for USDA price support programs. For years, this amounted to a subsidy for the conversion of wetlands to cropland.

We in USDA have worked long and hard with leaders of agricultural, environmental, and conservation groups to develop a definition of wetlands that most people could accept. At the same time, we've built in exemptions that keep the law from creating an undue hardship on farmers.

We now have agreement that wetlands are areas of soils that under natural conditions are saturated or covered with standing water most of the year (we call these hydric soils) and that support mostly water-loving (hydrophytic) plants. This definition is the key to the swampbuster provision. Broad acceptance of it will mean broad support for wetland conservation. It also will mean more people will understand that not every wet field is a true wetland.

Swampbuster encourages farmers to think twice about converting wetlands. In this time of large surpluses and low prices, there is little reason to bring wetlands into production.

And there are many reasons to preserve them: Wetlands provide some of the best habitat for fish and wildlife; control flooding by storing stormwater; trap pollutants; help recharge aquifers; and, last but not least, provide popular recreation areas.

Wilson Scaling

Cover: Willets, common shore birds in marshes and other wetland areas.

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

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Swampbuster—How It Affects Producers

If you asked a dozen people what wetlands are, you'd probably get a dozen answers.

But under the Food Security Act of 1985 there is only one right answer. That answer is the definition contained in the wetland conservation provision.

The definition says that wetlands consist of soils that are usually saturated or ponded—hydric soils—and that support mostly water-loving plants—hydrophytic plants. It was developed by, and is acceptable to, most agricultural, commodity, conservation, and environmental groups.

The wetland conservation provision is better known by another name—swampbuster. It applies to anyone who converts wetlands after December 23, 1985 (the date President Reagan signed the Food Security Act), and produces agricultural commodities on that land. Producers who do this become ineligible for the benefits of many U.S. Department of Agriculture programs, including commodity price supports, loans, crop insurance, disaster payments, and storage payments. Loss of eligibility applies to all commodities produced by the producer. Producers can regain eligibility by stopping production on the converted wetland area.

The wetland conservation provisions contain some important exemptions. Exempt is agricultural production on:

- Wetlands converted before December 23, 1985.
- Artificially created wetlands, including those created by irrigation return flows.
- Wetlands that became dry through natural conditions such as drought.
- Wetlands where the Soil Conservation Service determines that the conversion will have minimal effect on wetland values.

The swampbuster provision of the Food Security Act of 1985 discourages farmers from converting wetland areas like this freshwater marsh to cropland.

Photo by Katherine C. Gugulis, former public affairs specialist, SCS, College Park, Md., now head, Media Services, SCS, Washington, DC.

Unlike other conservation provisions of the Act, having—or not having—a conservation plan in no way affects eligibility for farm programs under swampbuster. It is the conversion and subsequent production of an agricultural commodity on certain converted wetlands that make a producer ineligible for USDA farm program benefits.

To understand swampbuster, you need to understand these definitions:

- Wetland conversion means draining, leveling, filling, or otherwise altering wetlands to produce agricultural commodities.
- Agricultural commodities are crops that are planted and produced by annual tilling of the soil.
- Producers are persons who share in commodities available for sale.

There are more than 75 million acres of wetlands in the contiguous United States—less than half the original total. About 5 million acres have high or medium potential for conversion to cropland, according to the SCS 1982 National Resources Inventory. About half of this acreage is in eight states: Florida, Alabama, Minnesota, North Dakota, Mississippi, North Carolina, Michigan, and South Carolina.

Under the law, SCS determines if an area is an existing wetland or a wetland that was converted to cropland after December 23, 1985. These determinations are made for producers who have applied for the benefits of Agricultural Stabilization and Conservation Service (ASCS), Farmers Home Administration, or Federal Crop Insurance Corporation programs.

Often, SCS conservationists will be able to tell in the office whether an area is classified as a wetland. They'll use lists of hydric soils, soil surveys, Fish and Wildlife Service wetland inventory maps, ASCS aerial photographs, and other resource data.

If they can't make an office determination, they'll go to the field. There, they'll decide if the area meets the criteria for hydric soils and hydrophytic vegetation.

Diana Morse,
public affairs specialist, Public Information Staff, SCS, Washington, DC

A Hard Look at Software

Welcome Aboard, FOCAS

> **WANTED:** *Office assistant. Must be able to handle multiple word-processing assignments simultaneously, draw graphs, calculate engineering equations, and file and retrieve information with better than 99 percent accuracy. Frequent overtime. Must be friendly.*

This help-wanted ad has been answered, and the capable, friendly assistant is coming to work in offices of the Soil Conservation Service. The new worker is a system of small computers and workstations named FOCAS (Field Office Communication and Automation System).

The SCS North Carolina State office has received two FOCAS systems. One computer was put to work as a data base system to handle the bulk of State office operations; it has two workstations. The other computer, with five workstations, is mainly used for training field office personnel but will also be used for assisting the primary system.

Only 40 years ago, the first large-scale electronic digital computer was unveiled. This 30-ton marvel, ENIAC (Electronic Numerical Integrator and Computer), was home to more than 17,000 vacuum tubes, 70,000 resistors, 10,000 capacitors, 6,000 switches, and 500,000 soldered joints. It was 100 feet long, 10 feet high, and 3 feet deep and required 140 kilowatts of power. Reprogramming involved unplugging and replugging hundreds of wires, much like a telephone switchboard.

One of the new FOCAS computers, on the other hand, can store 1,000 times more data internally and almost 150,000 times more when the hard disks are included. In fact, each workstation is capable of acting as a stand-alone computer with a memory several hundred times greater than ENIAC.

The two FOCAS computers and seven workstations in North Carolina are capable of storing more than 400 million letters and numbers. That's equivalent to 100,000 typewritten pages—a very large book by anyone's standard. The power requirement for all of this is less than 2 kilowatts.

FOCAS cannot do everything. But what it does, it does exceedingly well. That leaves SCS employees free to do the things that they do exceedingly well, such as exercising judgment.

In North Carolina, SCS is beginning to use FOCAS on high workload applications such as word processing, using electronic printers as typewriters. Other uses include property inventory and engineering applications. As FOCAS-specific software arrives, SCS will be able to include cooperator files.

FOCAS should help SCS to better advise landowners and land users throughout the country on the wise management of our precious soil and water resources.

Archibald P. Hudgins,
coordinator, Information Resources Management, SCS, Raleigh, N.C.

SCS Goes to CAMPS

This fall, Soil Conservation Service employees from field offices, State offices, national technical centers (NTC's), and national headquarters in Washington, DC, met in Rockville, Md., to discuss their summer with CAMPS. They didn't trade camping stories, but shared their experiences from a summer test of the agency's Computer Assisted Management and Planning System (CAMPS).

CAMPS is the computer software developed by the SCS field office support staff for use with the microcomputers to eventually be installed in all SCS field offices as part of the Field Office Communication and Automation System (FOCAS).

Testing of the software this summer in 19 States, four NTC's, and national headquarters was to see how well the software meets the needs of a typical SCS field office staff and how easily users can learn to operate it. The purpose of the meeting this October was to discuss what field staffs liked and didn't like about CAMPS and develop solutions to any problems they may have had with entering or using data, setting up client files, or other tasks.

The SCS district conservationists (DC's) who participated in the summer test said that overall their staffs liked using CAMPS. The DC's said that some users had difficulty at first operating the microcomputer, but once they became comfortable with the machine they had no major problems using the CAMPS software.

The CAMPS menu, or list of actions from which the user can choose, covers client services as well as program and administrative activities. The main goal of the automation effort in SCS is to enable field staffs to run resource inventory data for a field or farm through an evaluation scheme and come up with several alternative treatments and their costs to present to landowners.

In the past, SCS conservationists have had to plan conservation systems and weigh alternatives using pen and paper. Soon, they will be using microcomputers and specially designed software.

CAMPS currently includes routines for maintaining client records, inventorying resources, planning conservation systems, writing long-term contracts, using the universal soil loss equation, and reporting progress. Plans are to include at least 13 other functions that will help field staffs determine the economic benefits of conservation practices and systems, design agricultural waste management systems, evaluate and design irrigation systems, evaluate range improvement methods, consider hydrologic and hydraulic data in their planning and design work, use the wind erosion equation, and do their workload analyses, plans of operation, and scheduling.

One thing DC's stressed was that the software must be flexible enough for them to adapt CAMPS applications to cover resource conditions that are characteristic of their county. The leader of the team that developed the software, Owen Unangst, an SCS supervisory soil conservationist in Fort Collins, Colo., assured them that the software was designed to enable States to include applications unique to their needs.

A revised version of CAMPS is planned to go to 300 SCS field offices by the spring of 1987.

Improved conservation planning is the first result expected from the new software. This is because of the vastly improved data storage, data use, and documentation that CAMPS provides. DC's and others from State and NTC offices see it taking a little longer to see substantial time savings across the board because of the time it will take field staffs to get equipment installed, enter data into the system, and become expert users.

Under the conservation provisions of the Food Security Act of 1985, more and more farmers and ranchers, to retain their eligibility for certain U.S. Department of Agriculture farm programs, will be going to SCS field offices for conservation planning assistance. Having CAMPS in working order will help field staffs manage the workload.

Nancy M. Garlitz,
editor, *Soil and Water Conservation News*, SCS, Washington, DC

CRP—Good News for Minnesota Farmers

Like this sloping field planted to winter wheat, nearly a quarter of the cropland in Le Sueur County, Minn., is highly erodible and eligible for the Conservation Reserve Program. The erosion rate on this field is more than 20 tons per acre per year.

If they put Dale Traxler on the evening news, it would go something like this: Here is another farmer hounded by debts, whipped by the weather, and held hostage to international grain markets. After 17 years of farming, he's throwing in the towel.

Yet Traxler looks and talks more like a man with a dream, than one who has given up. To be sure, farming his hilly south-central Minnesota land was never easy. He's had to change courses a couple of times, and, at 49, he does have a few gray hairs. But he still has his house and land, is busier than ever, and is enjoying life.

Traxler has simply found a better use for his farm than farming. He is turning the bulk of it into a private game preserve. Under the new Conservation Reserve Program (CRP) of the U.S. Department of Agriculture, he will receive annual payments of about $80 per acre for converting 167 acres of his hilliest cropland to wildlife habitat.

"It's the only way I can hang on to this place," he said. "One time I owned it free and clear. Now I owe a $300,000 mortgage. With CRP payments I should be able to keep it."

In all, Traxler has 240 acres. He raised beef cattle until a few years ago when he and nearly all the other farmers in Le Sueur County switched to corn, soybeans, and wheat. Then grain prices fell to the point that Traxler could no longer make a living farming. He went into the drainage business with his son.

"This land should never have been broken out in the first place," Traxler said. "Not counting my labor and the cost of the land, I would put $120 an acre into farming it and get $190 back. My neighbors would do the same thing on their flat land and get $220 or $230 back. Over the years, that adds up. And it's all because of the hilliness of the land."

The 167 acres he placed in the CRP consists of clay loam soils with slopes of 9 to 18 percent. To provide a good mix for wildlife, Traxler is planting 39 acres to switchgrass; 12 acres to pine, cedar, ash, and maple trees; 2 acres to indiangrass and bluestem; and the rest to an alfalfa-brome mixture.

When this land was cropped, tons of sediment flowed into a 60-acre slough managed for wildlife by the Minnesota Department of Natural Resources (DNR). The permanent wildlife plantings will reduce the amount of sediment entering the

Under the Conservation Reserve Program, this field of highly erodible cropland will be planted to alfalfa brome unless it is determined that the established cover is already effectively controlling erosion. Evaluating the cover with the landowner, George Weaver, center, are Floyd Mueller, left, Le Sueur County executive director of the Agricultural Stabilization and Conservation Service, and Mike Taylor, SCS district conservationist.

slough. Traxler also hopes the combination of his wildlife plantings and the water in the slough will provide habitat for ducks and other waterfowl that travel the Mississippi Flyway as well as upland game birds such as pheasant.

"I've always wanted to do something for wildlife," Traxler said. "Over the years I've planted a few rows of wildlife food crops, but nothing on this scale before."

The CRP is designed to reduce soil erosion and crop surpluses by taking highly erodible land out of production and keeping it in grass and trees for a minimum of 10 years. Participating farmers receive payments equal to about half the cost of establishing the new plant cover, plus annual rental payments for 10 years. The land cannot be cropped or grazed, but can be developed for wildlife.

The CRP is administered by USDA's Agricultural Stabilization and Conservation Service (ASCS). The Soil Conservation Service determines whether land is highly erodible and thus eligible for the program. SCS also provides conservation planning and technical assistance for establishing the permanent cover. In promoting the CRP in Minnesota, ASCS and SCS have been joined by USDA's Extension Service, the University of Minnesota, local conservation districts, the State DNR, and many private wildlife and conservation groups.

During 1986, the first year of the program, more farmers signed up for the CRP in Minnesota than in any other State. Of the State's 100,000 farmers, more than 7,000 entered the CRP. Many, like Traxler, are developing wildlife habitat.

Minnesotans are a resource-oriented, outdoorsy type of people. The State has made a legend of its sky blue water and 10,000 lakes. DNR estimates that every other man, woman, and child in Minnesota owns a fishing rod. In winter, many will chop through 2 or 3 feet of ice to use them.

About half of the State's 4 million people live in the cosmopolitan Minneapolis-St. Paul area, but most have rural roots. These cities support large chapters of such wildlife groups as Ducks Unlimited, Pheasants Forever, and the Minnesota Waterfowl Association, three private groups that are helping to promote the CRP.

Although Minnesota is a major agricultural State, farming in this wet, northern climate can be an expensive, risky business. The soils are generally fertile, but even those on the flatlands commonly need to be drained and protected by windbreaks. Most common crops can be grown, but if a crop is drowned early in summer the short growing season allows little time to prepare a new seedbed and start over. It's not uncommon to see corn standing in a snow-covered field over winter because it was too muddy in the fall to harvest. Farming the sloping land only increases the wear and tear on equipment, the consumption of fuel, the cost of trying to replace the nutrients lost to water erosion, and the risks of crop failure. Thus, many farmers welcome a guaranteed return on their more marginal cropland.

Retirement is also frequently given as a reason for placing cropland in the CRP. About 34 percent of the farmers in Minnesota are 55 or older.

A few miles from Traxler's place, George Weaver owns 2,000 acres of hilly farmland near Horseshoe Lake. Weaver is 65. He and his wife, who have no children, would like to retire and obtain a reliable income by renting out their farm—or parts of it. Land values have dropped too much to sell.

Weaver has been farming since he was a teenager. Having bought three expensive self-leveling combines, he knows firsthand the cost of farming sloping land. By adjusting for the slope, the combines keep the sieve level to sift the grain from the chaff. Although they can adjust for slopes up to 18 percent, they still cannot compensate for the slope on all of Weaver's land. Last year one of his neighbors luckily escaped injury when a combine turned over on some hilly cropland.

Farming hilly land is no easier for tenants. "If they're just starting out in farming," Weaver said, "the machinery is usually too complicated for them. I've had four tenants so far, and three of them have gone under."

Weaver's farm is not all in one tract. Some fields are more hilly than others, and some fields are more accessible than others. This year he placed 450 acres of his most rolling, inaccessible cropland in the CRP.

"The thing I like about CRP is that it put me in control again. Now I know what I can count on from this land and not worry about it," he said. "Then I can rent the rest of my farm, which is the best land, and get out of farming if I want to."

One of the crop fields he put in the CRP borders Horseshoe Lake. "Something also had to be done about the runoff," he said. "Sometimes there was foam in the lake 16 inches thick from all of the chemicals on that field. This should help clean it up."

If they could afford it, many farmers would terrace their hilly cropland. But many can't afford terraces. For them, the CRP offers an affordable way of being responsible stewards of the land.

LeRoy Olsen, 34, was raised on a dairy farm in Lyon County. He left home after high school, spent a couple of years in the military service, then worked for a local construction company installing terraces for 8 years. When his father, who is 69, retired recently, Olsen returned with his wife and two small children to run the family farm.

A disagreement soon arose about what to do with 16 acres of steep cropland that runs for about a half mile along East Twin Lake. When the younger Olsen plowed this land, the steep grade would make his tractor "snort" and he could see where streams of sediment were flowing down into the lake, a descent of more than 100 feet.

"When I first moved back to the farm," Olsen said, "I wanted this area terraced. But Dad said no because terraces cost a lot and they are hard to farm. He suggested that we put it into alfalfa for hay, but my concern was that I would have to stand on the side of that hill and bale it."

The two continued to disagree until the spring of 1986 when the son read about the CRP. "I knew it was a program for us, but I had to talk Dad into it. At first he wasn't interested, but then he saw that we could get a little money from it and agreed."

Olsen, who rents the farm from his father, then offered to place the land in the CRP for $65 an acre, with each of them getting half. After an onsite inspection by the local SCS staff to certify the land's eligibility, the bid was accepted. The land, some of which was eroding at a rate of 45 tons of soil per acre per year, is now being seeded to oats, alfalfa, brome, orchardgrass, and intermediate wheatgrass.

Now that he has the land in the CRP, Olsen is no longer trying to talk his father into terraces. "Terraces are fine," he said, "but if I never see this land come back into production, that's okay with me. These 16 acres should never have been brought into production in the first place."

Another Lyon County farmer who is concerned about soil conservation is Gene Heinis. Heinis owns 440 acres north of Russell and has placed 233 acres of his hilliest cropland in the CRP.

Heinis would have liked terraces, but always knew they were impractical for his farm. Terraces are most suitable to long, gentle slopes. The hillsides on Heinis' farm are short and tend to meet from all directions. Terraces would have been difficult to lay out on this land and difficult to farm once they were in place.

Still, Heinis is concerned about erosion and what it is doing to his farm. "I felt I had erosion under control when most of my farm was in pasture," he said. Then a few years ago he switched to row crops, and the erosion rate on parts of his farm shot up to 20 tons of soil per acre per year.

"I followed the farm bill legislation from the beginning. I talked to my congressman about it, read the newspapers, and then talked to the local SCS and ASCS people," he said. "When it became law, I was ready."

Heinis signed up land in each of the first three signups, each time getting $70 per acre, the maximum for the bid pool in his area. He is planting the land to alfalfa, brome, orchardgrass, and wheatgrass and hopes to see more wildlife in the area within a couple of years.

"Conservation is the main reason I'm participating in the CRP. I also felt the rent was fair," he said. "Besides, I'm getting older and my equipment is too. We need to slow down. And I'm tired of worrying so much about the weather."

Heinis is in his mid-fifties and plans to continue farming. He has seven children—the youngest is 15—and predicts that one of them will one day want to run the farm.

"I'm urging all of my kids to go to college first," he said. "Then if they want to come back to farming, that's their business. Maybe farming will be better then. Maybe the CRP will help. I have to be an optimist. As a farmer, I don't have any choice."

Heavy workloads created by record CRP signups in some parts of Minnesota have required temporary reassignments among SCS field staffs. Jim Williams, right, SCS district conservationist in Murray County, checks with Larry Schmidt, SCS district conservationist in Lyon County, before making an onsite validation of one of the more than 150 land parcels submitted for the CRP in Lyon County, which has about three times as many CRP participants as Murray County.

Photo by Michael Price, public affairs specialist, SCS, St. Paul, Minn.

Government officials are also optimistic. Field office staffs of ASCS and SCS point with pride to the sloping fields they have helped bring into the CRP. And they speak knowingly of other fields that should be brought into the program and will be as soon as the farmer decides—for one reason or another—that enough is enough.

"If we get enough of this marginal land out of production," said Floyd Mueller, Le Sueur County director for ASCS, "the price of corn will go up again and farming will be a good thing again. This is one of the best programs to ever come out of Washington, DC."

In the State capital of St. Paul, State and Federal managers chart statistics that show that Minnesota farmers have now placed more than 661,000 acres in the CRP program out of a total of 1.9 million acres in the State that are eligible. The program, they say, is not only well on its way to meeting USDA goals but is also making a lot of other people happy in the process.

"This program has everything," said Tim Bremicker, of the Wildlife Division of DNR. "Not only are we doing something for the farmers, but we're doing something for Minnesota—for the lakes and the wildlife that the people of this State care so much about. It's the right program, at the right time."

Paul D. Barker,
associate editor, *Soil and Water Conservation News,*
Washington, DC

Reinvest in Minnesota

The Minnesota State Legislature this year allocated $9.4 million to purchase conservation easements as part of a new program to protect natural resources and enhance farm, forest, and tourism economies.

The new program, Reinvest In Minnesota (RIM), creates a land set-aside program to convert marginal and highly erodible cropland to wildlife habitat. It also creates a long-range management program for fish and wildlife and a private/public matching fund to acquire and improve critical fish and wildlife habitat areas.

The land set-aside part of the program is administered through the State's soil and water conservation districts through the Minnesota Soil and Water Conservation Board in the Minnesota Department of Agriculture and is similar to the Conservation Reserve Program (CRP) of the Food Security Act of 1985. As under the CRP, landowners are paid for retiring marginal cropland for a minimum of 10 years. The two programs differ, however, in the method of payment, nature of the agreement, and eligibility requirements.

Unlike the CRP, which pays the landowner annual rental payments for 10 years and cost sharing for establishing the new cover, RIM pays one lump sum and all of the costs for establishing the new cover up to $75 per acre. For a 10-year easement, RIM pays 90 percent of the average CRP bid accepted in the county. For a perpetual easement, RIM pays 70 percent of the average value of farmland in the township. CRP agreements are legal contracts. RIM easements are attached to property deeds and recorded.

To be eligible for the CRP, land must be in certain capability classes and eroding three times faster than the "tolerable" rate of soil erosion. RIM is based on a list of soil types that are considered marginal farmland and highly erodible. The planning process is basically the same for land in both programs and is based on SCS specifications for land retirement.

"The RIM program complements the CRP program," said Wayne Edgerton, RIM coordinator for the Minnesota Soil and Water Conservation Board. "We're telling farmers who have land eligible for the CRP to put their land into it and then see us about the fringe areas that may not qualify for the CRP. Many of these areas qualify for the RIM program and require the same type of management."

The RIM legislation grew out of a Governor's task force recommendation several years ago on ways to improve the hunting and fishing in the State. It was passed in 1985 and initially funded in 1986 for 1 year. The Council of State Governments plans to recommend it in 1987 as a model for all States.

Districts Help Meet CRP Needs

Triple-sized grass drills can be used to seed up to 160 acres a day.

Local conservation districts are scrambling to help farmers in the Oklahoma Panhandle to obtain grass seed and drills to convert their highly erodible cropland to grassland under the new Conservation Reserve Program (CRP) of the U.S. Department of Agriculture.

A shortage of grass seed and drills occurred in Cimarron, Texas, and Beaver Counties, Okla., after farmers in the three Panhandle counties enrolled more than 204,000 acres in the CRP during the first three signups in 1986. Almost 900 contracts were written, and most of the acreage is scheduled to be planted to grass.

"There are not enough grass drills available to meet the need, so conservation districts are buying new drills to make available to farmers," said Worth Jeffers, Texas County Conservation District board member.

The conservation districts in Texas and Cimarron County both recently purchased triple-sized drills made by hooking three 12-foot grass drills together. Up to 160 acres a day can be seeded with one of these units. For easier transporting, the two outside drills in these triple units can be folded inward with a hydraulic system.

In addition to the triple-sized drills, the Cimarron and Beaver County districts each have three additional 12-foot drills and the Texas County district has four 12-foot drills.

All three districts are obtaining supplies of grass seed for resale to farmers and ranchers. "Supplies of seed are very short this year and districts are working to find as much as possible for this fall and next spring's planting," said Hal Clark, Cimarron County Conservation District director. "Hopefully, there will be a good seed crop next year which will ease the problem."

To help the districts locate seed, the Oklahoma Conservation Commission has set up a clearinghouse to connect districts that are looking for seed with those that know of seed for sale. "We hope to save the districts a lot of phone calls trying to chase down seed supplies," said Mason Mungle, executive director of the Commission.

Most of the land going into the CRP is being planted to native grass or the old world bluestems. "These grasses are the most suitable for the panhandle area," said Jerry Allen, SCS district conservationist for Texas County. "We feel they will be easy to maintain and will provide good erosion control and wildlife cover. Although the landowners are not allowed to graze or hay the area while in the CRP, the grass will provide good palatable vegetation at the end of the 10-year contract period and will be building up the land in the mean time.

Under the CRP, farmers will have the option to delay the planting of grass until grass seed is available. Should grass seed not be available, farmers may also get half the cost of planting temporary cover should previous crop residues not be adequate to control soil erosion.

F. Dwain Phillips,
public affairs specialist, SCS, Stillwater, Okla.

Farmers Pool Resources, Survive Drought

At left, Robert Bowie, SCS district conservationist in Edgefield County, S.C., discusses group irrigation pond with two of the peach farmers cooperating in the project, William G. Smith, III, center, and William G. Smith, Jr.

In South Carolina, the summer of 1986 will go down as one of the hottest and driest years on record. By August, rainfall in the State was about 21 inches below normal, and farmers watched their crops wither in the sun.

In Edgefield County, an innovative Resource Conservation and Development (RC&D) irrigation project made the difference between success and failure for one group of peach farmers.

Peaches are the county's biggest money crop, and its 12,500 acres of peaches make it number one in the State in peach production. Each summer hundreds of high school students and thousands of migrant workers are hired to pick and pack the fruit.

Most peach farmers have invested about $3,000 an acre before they ever pick their first peach. That's after having waited 3 years from the time the young trees were set out until the first harvest. But even after the orchards are mature enough to bear fruit, another factor can make or break peach production—water. Without a dependable source of water during critical growth stages peaches can be a very bad investment. There may be no market for peaches less than 2 inches in diameter while peaches 2½ inches in diameter can bring in $10 a bushel.

Realizing that a reliable supply of irrigation water for their peach orchards would be good crop insurance, five landowners with property adjacent to each other contacted the Soil Conservation Service in 1983 to survey a 20-acre irrigation pond on their farms.

Because of the size of the project and the economic benefits of peaches to the county, the irrigation pond was developed under the RC&D program. The Edgefield County Council and the Edgefield Soil and Water Conservation District sponsored the project through the Ninety-Six RC&D Area which covers Laurens, Greenwood, Abbeville, McCormick, Saluda, and Edgefield Counties.

SCS provided survey and design assistance and cost-share funds. The total cost of the irrigation pond, which provides 150 acre-feet of water storage, was $80,000, and it was completed in 1985.

In 1986, the Satcher-Smith RC&D Group Irrigation Pond, one of the first RC&D cost-shared group irrigation projects in the Southeast, provided 40 million gallons of water to irrigate more than 400 acres of peaches. "We got our investment back the very first year, and I believe the other farmers did too," said William Smith, Jr., one of the five farmers who cooperated in the project.

In the past 10 years, SCS has helped Edgefield farmers plan and construct over 150 irrigation ponds. The cost has varied from $2,000 to $80,000. The average annual benefits from irrigation are $750 an acre.

Irrigation ponds have saved South Carolina peach farmers millions of dollars and helped stabilize the economy in many rural areas. "During this year's drought, I don't know what we would have done without the pond," said Smith.

Robert L. Bowie,
district conservationist, SCS, Edgefield, S.C.

Group Sponsors Water Resources Law Symposium

The critical drought in the southeastern United States and continuing reports of water quality problems dramatize growing concerns about water. These concerns and issues of water allocation, regulation of water quality, and priority of water ownership are some of the subjects to be addressed in a 2-day symposium in Chicago, Ill., on December 14-15, 1986.

The "Water Resources Law" symposium will include presentations by 25 lawyers, engineers, government regulators, and other experts. They will address a variety of water resources law issues including legal, economic, and political constraints; ethical considerations; and suggestions for innovative solutions.

The symposium is sponsored by the American Society of Agricultural Engineers (ASAE) in cooperation with 15 other organizations. It will provide lawyers, engineers, water industry personnel, government officials, and others interested in water resources law an opportunity to learn about new developments in the field.

For more information contact ASAE, 2950 Niles Road, St. Joseph, Mich 49085-9659; or telephone (616) 429-0300.

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January	7–11	North American Gamebird Association, New Orleans, La.
	11–15	American Farm Bureau Federation, Anaheim, Calif.
February	8–13	Society for Range Management, Boise, Idaho
	14–18	American Association for the Advancement of Science, Chicago, Ill.
	16–19	Land Improvement Contractors of America, Las Vegas, Nev.
	26–27	International Erosion Control Association, Reno, Nev.
March	1–4	National Farmers Union, Fort Worth, Tex.
	16–20	American Society for Surface Mining and Reclamation, Billings, Mont.
	19–22	National Wildlife Federation, Quebec City, Quebec, Canada
	20–25	North American Wildlife and Natural Resources Conference, Quebec City, Quebec, Canada
	22–24	American Pulpwood Association, Washington, DC
	23–27	A Workshop: Soil and Water Conservation on Steep Lands, San Juan, Puerto Rico
April	22–26	Association of American Geographers, Portland, Oreg.
	25–29	American Planning Association, New York, N.Y.
	27–29	The Role of Legumes in Conservation Tillage Systems Conference, Athens, Ga.
May	7–14	National Council of State Garden Clubs, Bal Harbour, Fla.
	13–15	Southern Forestry Conference, Savannah, Ga.
June	13–17	National Environmental Health Association, San Diego, Calif.
	14–18	American Water Works Association, Kansas City, Mo.
	21–24	Forest Products Research Society, Louisville, Ky.
	21–26	Air Pollution Control Association, New York, N.Y.
	28–July 1	American Society of Agricultural Engineers, Baltimore, Md.

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